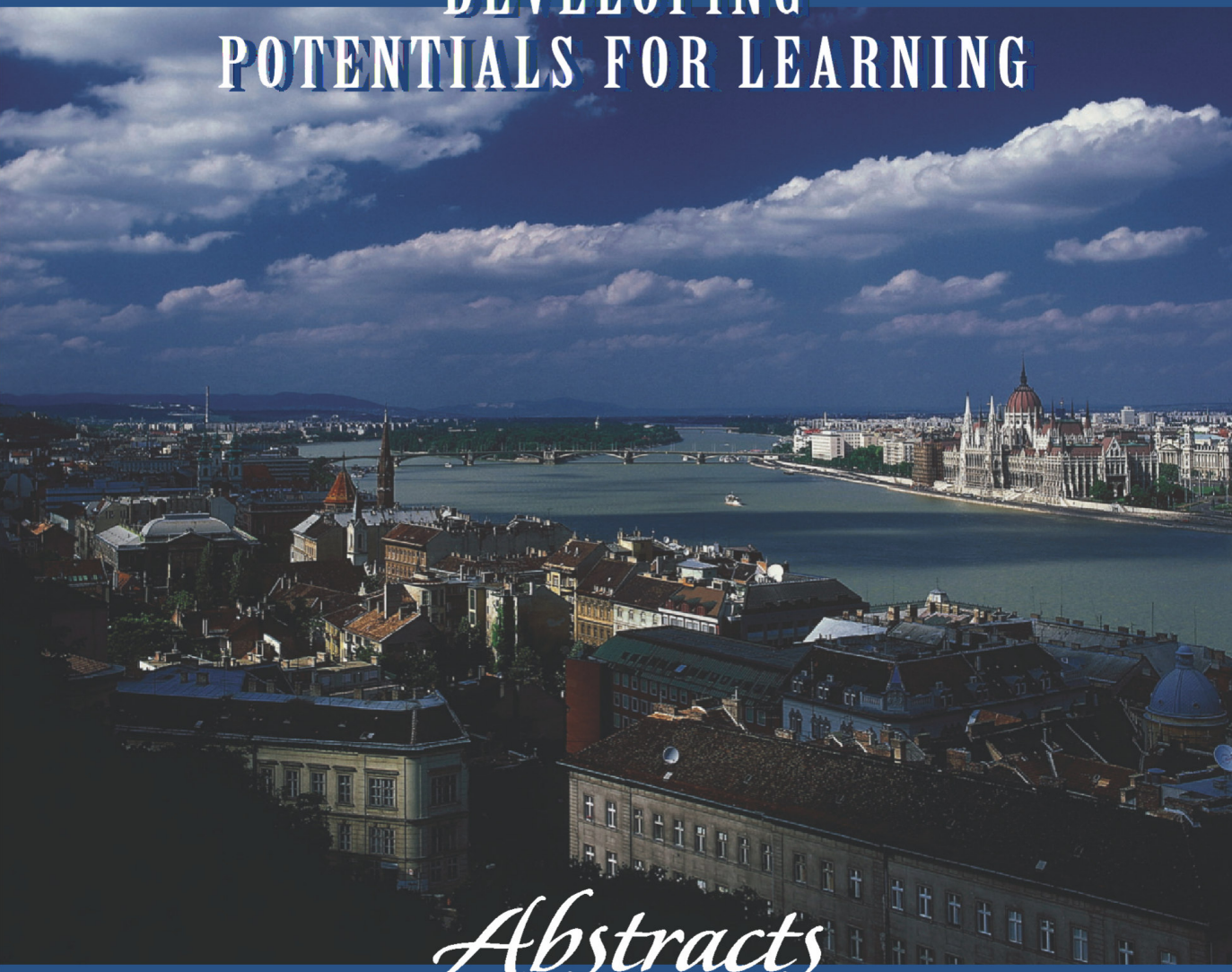
DEVELOPING POTENTIALS FOR LEARNING



Abstracts

12th Biennial Conference for Research on Learning and Instruction
Budapest, Hungary, August 28—September 1, 2007

Earli

UNIVERSITY OF SZEGED

12th European Conference for Research on Learning and Instruction

Developing Potentials for Learning

Biennial Meeting

Budapest, Hungary

August 28 – September 1, 2007

ABSTRACTS

Edited by

Benő Csapó and Csaba Csíkos

European Association for Research on Learning and Instruction
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A 1
28 August 2007 15:00 - 17:00
Room: Konferencia
EARLI Invited Symposium

Conceptualising learning in multicultural communities

Chair: **Guida de Abreu,** Oxford Brookes University, *United Kingdom*
Organiser: **Guida de Abreu,** Oxford Brookes University, *United Kingdom*
Discussant: **Eva Hjörne,** Göteborg University, *Sweden*
Discussant: **Michele Grossen,** Universite de Lausanne, *Switzerland*

This symposium examines advances in the conceptualisation of learning in multicultural communities. The presenters provide overviews of inter-linked empirical investigations, carried out by their research groups, over the last decade, as a response to the challenge of understanding learning in multicultural communities. The implications of successful schooling of young people from diverse ethno-cultural backgrounds are profound for their own well-being and socio-economic development of societies. To inform practices that promote successful development of learning potentials in multicultural schools, there is a need for systematic research focusing both on experiences of local communities and on comparative perspectives across communities and countries. This research certainly needs far more investment. The studies presented focus on communities and country level, including the Netherlands, UK, Spain, and US.These countries have in common unprecedendent levels of migration, which are drastically changing the ethno-cultural composition of their schools. Conferences like EARLI, in particular since Padova (2005), provide a forum for cross-country debate. The research reported shares a socio-cultural focus, i.e., an emphasis on investigating experiences, listening to the voices of those engaged in multicultural learning communities: learners, teachers and parents. The concept "experiences" is broad. It includes learners' experiences in mainstream and community schools (Cline et al.), on social interactions and negotiation of learning in classrooms (Haan & Elbers, Gorgoriô), on transitions between home and school cultures (Cline et. al., Civil, Haan & Elbers, Gorgoriô), and on how educators can build on these experiences to develop school practices that promote access and equity in multicultural education. Building on empirical findings the authors elaborate their theoretical perspectives (what are the processes underlying learning in multicultural communities: interaction between learning and identity construction; social representations, funds of knowledge). The implications of these conceptualisations for the advance of research and educational practices will be discussed.

Learning as the piloting of new identities in new contexts: representations of the learning process in a multicultural society
Tony Cline, University of Bedfordshire, *United Kingdom*
Evangelia Prokopiou, University of Northampton, *United Kingdom*
Sarah Crafter, University of Northampton, *United Kingdom*
Lindsay O'Dell, University of Brighton, *United Kingdom*

This presentation will review findings on pupils' learning from a series of projects in different types of educational setting in England over a ten year period. We will analyse pupils' representations of official curricula (mathematics teaching and religious education in publicly funded schools), communal curricula (the teaching of heritage languages and cultures in part-time classes and supplementary schools) and trans-cultural activities (the status of language brokering

among teachers and peers). Pupils from different backgrounds brought into school the skills, knowledge and identities that had been partially formed through experiences in their homes, in their family's communities and in the wider society dominated by an often hostile majority. We will examine how they represented the impact of their engagement with official and informal curricula on their further personal development. On that basis we wish to suggest how sociocultural theories of learning can take account of interactions between the ethos of an educational setting and the complex, dynamic development of learning identities in a multicultural context.

Learning and education in migration settings: between the classroom and home
Mariëtte de Haan, Utrecht University, *Netherlands*
Ed Elbers, Utrecht University, *Netherlands*

Over the past few years we have conducted research into the learning and education of the children of migrant families in the Netherlands. We studied both classroom settings and home settings, and focused on issues of cultural diversity and on how relationships between the institutional and the home setting mediate the construction of cultural diversity in educational contexts. The research is based on video and audio recordings of educational interactions at school and at home, as well as on interview data. In this presentation we present an overview of our research and link the results of the classroom studies and the studies conducted in the home setting. We focus in particular on: (1) migrant students' constructions of 'school' or school identities in multi-ethnic classrooms; (2) migrant parents' construction of 'school' and education in the Dutch context, and (3) the different bridging strategies that migrant children and their parents develop to navigate between traditional practices and those that are seen as normative for the Dutch school context. In our presentation we consider how educational practices are reconstructed in migration settings for both migrant children and for migrant parents. The overview allows us to reflect on how traditional practices gain new meanings in multi-ethnic settings across generations.

Conceptualizing mathematics teaching and learning in multicultural mathematics classrooms
Nuria Gorgorio, Universität Autonoma de Barcelona, *Spain*

In Catalonia, the group EMiCS – Educaciô Matemàtica i Context Sociocultural – (Mathematics Education and Sociocultural Context) has been researching, for nearly one decade now, the difficulties that immigrant students face when learning mathematics in mainstream schools. The picture of the teaching and learning mathematics in multicultural classrooms is a very complex one. From a short-distance, we see the actions and interactions that take place within the classroom, as a micro context, that can be understood by using constructs such as norms, discourse, and identities. However, the action that one sees as taking place in the centre of the scene, has to be interpreted within a wider scenario, the different macro contexts where the mathematics classroom and its participants belong to. It is at this point where social representations allow us to explain how are norms established, and why norms orchestrated into practice give way to a classroom discourse that too often does not open spaces for immigrant students' participation; a classroom discourse that, instead of minimising cultural and social distances, increases them to the point that certain students develop a non-participation identity. We are convinced that a better understanding of the complexity of the multicultural mathematics classroom should be useful to increase the opportunities for immigrant students learning mathematics.

Building on community knowledge: an avenue to equity in mathematics education in multicultural communities
Marta Civil, University of Arizona, *USA*

In this presentation I reflect over my more than a decade of work in mathematics education in working class, Mexican/Mexican American communities in Tucson. In our local context, language and ethnic "minority" students from economically underprivileged backgrounds tend to fall further behind in their mathematical learning as they move up through the grades. These students are often exposed to an education approach based on a deficit model in school teaching. Such a model presupposes that the households of these children are at the root of "the problem." Our work rejects this deficit model and in fact is grounded on a view that these households and communities have a wealth of knowledge and resources ("funds of knowledge") that are untapped in school (Moll, Amanti, Neff & González, 1992). Furthermore, we have also gathered evidence that these children are often active participants in the functioning of their household and in the community, in sharp contrast with the passive role that they are often assigned at school (Civil & Andrade, 2002). What are the implications for the mathematical education of these children, if we take their experiences and backgrounds as resources for learning in the classroom? This presentation addresses this question while paying special attention to the challenges in the pedagogical transformation of household knowledge into mathematical knowledge for the classroom. These challenges are related to teachers', students' and our own beliefs about what counts as mathematics. I conclude this presentation with my reflection on the concept of parents / families as intellectual resources.

A 2
28 August 2007 15:00 - 17:00
Room: 0.87 Marx
SIG Invited Symposium

Educational effectiveness in the early years

Chair: **Jan Van Damme,** Katholic University of Leuven, *Belgium*
Organiser: **Jan Van Damme,** Katholic University of Leuven, *Belgium*
Discussant: **John Ainley,** Australian Council for Educational Research (ACER), *Australia*

Most educational effectiveness research has explored the size, consistency and correlates of school or teacher effectiveness in primary or secondary schools. The early years of education, including pre-school education, have received relatively little attention. This symposium seeks to redress this neglect by bringing together a range of papers that focus explicitly on the topic of educational effectiveness in the early years. Contributors from a range of countries explore evidence on factors that influence young children's educational outcomes in the pre-primary or early elementary years using quantitative and mixed methods approaches. Topics covered include: the equity gap for low SES and ethnic minority children (Belgium – Flanders); evidence of continued pre-school effects on children's education outcomes in primary school (England); teacher and school effectiveness in pre-primary education and the generalisability of educational effectiveness models in this context and phase (Cyprus); changes in the attainments of children measured at entry to primary school in relation to a series of major policy changes in the pre-primary early years (England) and findings from an evaluation of the implementation of a new curriculum for the Foundation stage of

education intended to improve quality and appropriateness of provision and foster better outcomes for children (Wales).

Socially disadvantaged and ethnic minority children's educational gap: Evolution and school effects
Jan Van Damme, Katholic University of Leuven, *Belgium*
Jean-Pierre Verhaeghe, Katholic University of Leuven & Ghent University, *Belgium*

Using data from an ongoing large longitudinal study, we investigated the evolution in educational gap between socially disadvantaged and ethnic minority children versus a reference group of mainly white middle-class children. Multilevel repeated measures analyses with a categorical classification of pupils according to social-eco®nomical and ethnic-cultural background confirm that with respect to mathematics achievement, home language effects tend to become smaller or even disappear in the first grades of primary school. However, the effects of SES-related background factors appear to be persistent. Although considerable differences were found between schools, no particular school effects were found for the two educational gaps.

Investigating the generalisability of models of educational effectiveness: A study on teacher and school effectiveness in Mathematics and Language at pre-primary education
Leonidas Kyriakides, University of Cyprus, *Cyprus*

In this paper, it is considered important to identify factors that explain differences in the effectiveness of schools and teachers in relation to different criteria rather than search for criterion consistency of school/teacher effects. It also is pointed out that although EER has generated evidence of the school and teacher effect on student achievement at both the primary and secondary school level, only few studies on effectiveness in early-years education have been conducted. Thus, the study presented here attempts to identify factors of school and teacher effectiveness in mathematics and language at pre-primary education. Stratified sampling was used to select pre-primary schools (n=76) in Cyprus. All the pupils (n=2812) who attended the last year of pre-primary education of the school sample were chosen. Student skills in emergent literacy and mathematics were measured at the beginning and at the end of school year 2005-2006. Information was collected on two student background factors: sex and socio-economic status. Quality of teaching was measured through independent observers whereas semi-structured interviews with head teachers generate data about school policy on teaching. The effects of variables measuring quality of teaching and school policy on teaching upon language and mathematics achievement are examined. The importance of establishing both generic and differentiated models is supported.

Investigating the continuing effects of pre-school children's outcomes at age 6 and 10 years: Emerging results from EPPE 3-11, a longitudinal study of children's progress and development in England

Pam Sammons, University of Nottingham, *United Kingdom*
Kathy Sylva, University of Oxford, *United Kingdom*
Edward Melhuish, University of London, *United Kingdom*
Iram Siraj-Blatchford, University of London, *United Kingdom*
Brenda Taggart, University of London, *United Kingdom*
Yvonne Grabbe, University of London, *United Kingdom*
Sofka Barreau, University of London, *United Kingdom*

The Effective Provision of Pre-school and Primary School Education Project (EPPE3-11) is a longitudinal study involving over 2500 children followed from age 3 to 11 years. The relative influence of different factors (child, family, home learning environment, pre-school and primary school) on children's reading and mathematics attainment and progress and on social behavioural development at age 6 and 10 years is explored using multilevel statistical analyses. The results indicate strong continued effects for a positive early home learning environment, as well as a range of other characteristics, including pre-school influences (measured by indicators of both the quality and effectiveness of the pre-school attended). In addition, the overall academic effectiveness of the primary school (measured independently using national data sets to provide value added indicators) has an effect on a range of educational outcomes. Interactions between pre-school and primary school effects reveal that attending a higher quality or more effective pre-school acts as a protective factor for children who go on to attend a less effective primary school whereas for home children (who did not attend pre-school) the effectiveness of the primary school attended is of particular importance for later attainment and social behaviour.

An evaluation of the Foundation Phase in Wales

Iram Siraj-Blatchford, University of London, *United Kingdom*
Kathy Sylva, University of Oxford, *United Kingdom*
Janet Laugharne, University of Wales, *United Kingdom*
Emmajane Milton, University of Wales, *United Kingdom*
Frances Charles, University of Wales, *United Kingdom*

The Foundation Phase is a Welsh Assembly Government, national reform covering the combined ages of 3-5 Early Years and 5-7 Key Stage 1 provision. In September 2004, the first stage of the pilot commenced in 41 pilot settings across the 22 local authorities in Wales for 3-5 year olds only. In September 2005 the 41 pilot settings continued and the pilot extended to primary schools. The Monitoring and Evaluation of the Effective Implementation of the Foundation Phase (MEEIFP) project is a two-year evaluation commissioned and funded by the Welsh Assembly Government. It adopted a mixed method approach, consisting of a literature review, systematic observations, field notes, semi-structured interviews, questionnaires and informal conversations involving all major stakeholders. Key findings are reported including recommendations about: curriculum, pedagogy, assessment and transition; best practice in the Foundation Phase; current quality and standards; qualifications, training and ratios; funding & resources and aspects of organisation and management.

Changes int he changes in the attainments of children on entry to school in England 2000-2006
Peter Tymms, University of Durham, *United Kingdom*
Christine Merrell, University of Durham, *United Kingdom*
Paul Jones, University of Durham, *United Kingdom*

England has seen massive changes in the Early Years over the last few years. There is now an official early childhood curriculum, free nursery education for three-year-olds, the Sure Start programme has started, the Neighbourhood Nurseries programme has been introduced for the most deprived communities and a national network of children's centres was launched in 2003. During this period, the CEM Centre at Durham University has been collecting consistent data from many thousands of children when they start school at the age of four on a range of variables that have been chosen because they good predictors of later success. These include for example vocabulary, concepts about print and simple arithmetic (without any formal notation). The extent to which these measures have changed from 2002 to 2006 inclusively will be examined and the link between the major initiatives and the findings discussed.

A 3
28 August 2007 15:00 - 17:00
Room: Harmónia
EARLI Invited Symposium

Large-scale assessment - National and international perspectives

Chair: **Cordula Artelt,** Bamberg University, *Germany*
Organiser: **Cordula Artelt,** Bamberg University, *Germany*

The aim of this symposium is to give an overview of methods, applications, and recent developments in the field of large-scale assessment. For many years, large-scale assessments have been the driving force behind new developments in educational measurement (e.g., application of item-response models). Drawing on representative samples, they provide insights into educational outcomes, their correlations with school and student background variables, and changes across assessment cycles. The four papers in this symposium examine recent methodological and content-related developments in national and international large-scale assessments, as well as their potential for educational research. Mark Wilson (USA) discusses the relationship between large-scale assessments, small-scale testing, and standard-based assessments, and considers the methodological challenges of the longitudinal perspective. Benő Csapó (Hungary) presents first results from the Hungarian Educational Longitudinal Survey for mathematics and reading, which aims at establishing a system-wide evaluation and accountability system. Manfred Prenzel (Germany) focuses on the potential that the Programme for International Student Assessment (PISA) holds for educational research, and presents Germany's longitudinal extensions to the international PISA 2003 assessment. Jürgen Baumert (Germany) presents further data from Germany's follow-up assessment to PISA 2003, focusing on teacher knowledge, teaching, and student progress within the PISA framework.

On the large scale
Mark Wilson, UC Berkeley, *USA*

For many years, large-scale assessments have been the driving force of new developments in educational measurement. The demands of the large-scale context have been the main driving forces behind the move away from the routine application of classical test theory towards routine use of item response models. At the same time, the limitations of large-scale testing tend to act as a brake on innovation, requiring high levels of efficiency, dependability, and sometimes just plain consistency with the past. In this presentation, I will discuss some of the more recent pressures for change, and tendencies towards inertia, that I see in large-scale testing. I will discuss the effects that the rise of so-called "standards-based" assessments are having on testing in the United States, in particular focusing on reactions to it, such as the development of concepts such as "learning performances" and "learning trajectories." These reactions need to be seen as occurring in a context where "small-scale" testing, such as assessment on the classroom and individual scales are becoming relatively much more important. I will then relate these to technical developments in the field. In particular, to longitudinal perspectives on modeling, to issues in vertical equating, and to ways to enable somewhat less rigid ideas of dimensionality, such as "essential" dimensionality and "thick" variables. I will conclude with some comments on where I see these linked issues leading, both for large and small-scale testing, and within the technical domain.

First results of the Hungarian Educational Longitudinal Study
Benő Csapó, University of Szeged, *Hungary*

The number of longitudinal surveys conducted or launched in educational context has been growing in the past decade. Among the traditional – mostly theoretical, developmental-psychological – reasons new aspects initiate such focused works which are related to the improvement of the quality of education. Building system-wide evaluation models, improving accountability, understanding and preventing school failures are among these new aspects. The research questions of the first large-scale Hungarian longitudinal educational study launched in 2003 focused around similar problems. In order to have comprehensive a picture about the 12 years of the compulsory schooling, the design of the survey combines longitudinal and cross-sectional aspects. Representative samples of 1st (N1<5200), 5th (N5<4300) and 9th (N9<3755) grade students were drawn where school classes were the units of sampling. Several questionnaires and tests were administered to the students at the beginning and at the end of the school years to collect data on their cognitive and affective characteristics, school achievements, and social background. By the end of the 2006/07 academic year, data of five waves of surveys will be available. This paper presents the overall results on the stability of the development of students within the education system, and discusses the role of those factors which predict the later achievements and failures. The first analyses emphasize the importance of the early development of mathematics and reading skills. Data confirm the hypothesis that teachers' evaluation is partly based on their subjective expectations: higher correlations were found between the grades given by teachers over years than between any other cognitive or affective variables.

How PISA can be used for educational research
Manfred Prenzel, IPN Kiel, *Germany*

Large scale assessments like the OECD "Programme for International Student Assessment" (PISA) are based on excellent representative samples. These studies inform about educational outcomes, their correlations with school and student background variables, or changes between the

assessment cycles. Attempts to explain differences between countries or subpopulations are limited by the survey design of these studies. On the other hand, the design of PISA can be extended by national options. This opportunity has been widely used in PISA 2003 by the national project managers in Germany: In a follow-up study all the students and an additional sample of two classes from each school had been tested again in 2004. The aim of the study was to test explanations models for the development of math and science competencies under classroom conditions. All the students in this sample had completed additional (national) math and science assessments. Also the parents of the students and their mathematics teachers had to fill in questionnaires. The design of this study allowed multi-level-analysis. The papers presents some of the findings from this study which show that extended large scale assessments can help to interpret international comparisons, and, at the same time, can contribute significantly to educational research.

On the way to causal Inferences: teacher knowledge, teaching, and student progress within the framework of PISA
Jürgen Baumert, MPI, Berlin, *Germany*

This presentation describes the longitudinal extension to PISA 2003 in Germany, which included a study of mathematics teachers' content knowledge and pedagogical content knowledge and how these knowledge components relate to high-quality instruction. The structure of mathematics teachers' professional knowledge will be analyzed, and structural equation modelling will be used to test the extent to which these knowledge components predict the quality of mathematics instruction and students' learning gains.

A 4
28 August 2007 15:00 - 17:00
Room: -1.63
Symposium

Why constructivist teaching does not work

Chair: **Jeroen van Merriënboer,** Open University of the Netherlands, *Netherlands*
Organiser: **John Sweller,** University of New South Wales, *Australia*
Organiser: **Richard Clark,** University of Southern California, *USA*
Organiser: **Paul Ayres,** University of New South Wales, *Australia*
Organiser: **Paul Kirschner,** University of Utrecht, *Netherlands*
Discussant: **Alexander Renkl,** University of Freiburg, *Germany*

The last half century has seen a considerable emphasis on minimising guidance during teaching with the use of discovery learning or constructivist teaching techniques gaining prominence. The popularity of these techniques has been maintained despite a near total lack of supporting empirical evidence based on randomised, controlled experiments. Instead, the empirical evidence almost uniformly supports a heavy emphasis on instructional guidance. Furthermore, most current conceptions of human cognitive architecture and the epistemology of learning and teaching either explicitly or implicitly reject the notion of learners discovering knowledge with minimal instructional assistance. The four presentations of this symposium explore the various empirical, cognitive and epistemological issues associated with this debate.

Human cognitive architecture and its implications for constructivist teaching
John Sweller, University of New South Wales, *Australia*

Human cognitive architecture constitutes a natural information processing system whose evolution has been driven by another natural information processing system, evolution by natural selection. Considering human cognition from an evolutionary perspective has considerable instructional consequences. Those consequences can be used by theories such as cognitive load theory to generate instructional procedures. All such procedures place their emphasis on direct instruction rather than versions of discovery learning or constructivist teaching. Discovery learning techniques were developed prior to our current understanding of human cognitive architecture and are incompatible with that architecture. As a consequence and unsurprisingly, the field has failed to produce a large body of empirical research based on randomised controlled experiments demonstrating the effectiveness of constructivist teaching techniques.

Borrowing expertise: Cognitive task analysis for complex learning
Richard Clark, University of Southern California, *USA*
Kenneth Yates, University of Southern California, *USA*
Sean Early, University of Southern California, *USA*

This presentation extends the discussion of the "borrowing and reorganizing principle" introduced by Geary (2005, In Press) and elaborated by Sweller (2006) as an explanation for the failure of constructivist learning strategies (Kirschner, Sweller & Clark, 2006). During schema construction all "learned" information is "borrowed" from the experiences of experienced (expert) others through observation, modeling and direct instruction and then reorganized to achieve performance goals. Over the millennia, the borrowing process has, by necessity, focused on observable aspects of expertise. Complicating this process for learners is evidence that about 70 percent of expert processes are automated, unconscious and not observable by either the expert or the "borrower" (Clark & Elen, 2006). The consequence is that learners, instructional designers and teachers find it difficult to observe and borrow the many covert, implicit cognitive strategies and processes used by experts. This presentation offers evidence from a number of studies to support the claim that the borrowing process can be made significantly more efficient and effective if we employ Cognitive Task Analysis (CTA) to capture the implicit expert processes necessary to support successful complex task performance and provide them to learners as part of the instructional design and development process. Finally, the use of CTA in instructional design is briefly described here and elaborated in the presentation by van Merriënboer in this symposium.

Why constructivist mathematics teaching does not add up
Paul Ayres, University of New South Wales, *Australia*

This paper argues that the constructive approach many 'reformists' advocate for teaching mathematics is flawed. Some of the main tenets of constructivism are examined along with how these central ideas have been linked directly to teaching mathematics. The emphasis on problem solving and shared social interactions rather than the use of expository teaching is considered. Several points are made. Firstly, the paper seeks to define constructivist teaching, and explain how different interpretations of epistemological theory have led to diverging opinions on the role of problem solving and discovery learning. Secondly, it argues that the constructivist approach fails to take account of recent findings in human cognitive architecture, preferring a one-size-fits-all model irrespective of the knowledge base of the learner. Thirdly, it is argued that constructivists have

ignored the wider findings of teacher effectiveness research, which clearly identify a significant role for direct instruction. Fourthly, it is argued that constructivism has a weak research base, heavily reliant on small-scale qualitative data and lacking randomised, controlled experiments. Finally, the paper argues that the strong push for reforms based on constructivism has fuelled a public perception that mathematics teaching is in decline due to the advent of 'fuzzy' maths.

Epistemology is not equal to pedagogy
Paul Kirschner, University of Utrecht, *Netherlands*

Just as a child is not a little adult, a learner is not a little scientist. Children's concepts are different in structure and meaning from adults. As such, how one best learns and should be taught in a domain is quite different from how one performs or "does" in a domain. The problem is that because experimentation and discovery is central to how knowledge is acquired by scientists (i.e., experts), many then feel that experimentation and discovery should also be used as the pedagogy for acquiring knowledge, organising the curriculum, and designing the learning environment. But this is not the case, and it is naive to assume that a theory of education, teaching and/or learning can be extracted directly from a philosophy of science. They are separate entities requiring vastly different activities. Discovery presupposes a prior conceptual framework. By means of discovery one can investigate relationships between concepts, but there is no guarantee that it will lead one to new concepts. This depends upon the structure and content of existing knowledge. Constructivist teaching approaches fail to distinguish between the learner/novice and the doer/expert and thus to distinguish between teaching/learning a science and doing a science. The mistake lies in overlooking that students are not experts and do not practice a science, but they are novices and are learning about a science and/or learning to practise a science. It is the teacher's job to teach science, teach about science and teach how to do science. It is not the teacher's job to practice science as part of the teaching exercise. This presentation discusses this educational anomaly.

A 5
28 August 2007 15:00 - 17:00
Room: -1.64
Symposium

Developing potentials for mathematics learning through metacognition

Chair: **Anneke Vrugt,** University Amsterdam, *Netherlands*
Organiser: **Anneke Vrugt,** University Amsterdam, *Netherlands*
Organiser: **Annemie Desoete,** Ugent & Arteveldehogeschool, *Belgium*
Discussant: **Patricia Alexander,** University of Maryland, *USA*

This symposium is devoted to the relationship between metacognition and mathematical problem solving skills. Despite all the emphasis on metacognition, researchers currently use different concepts for overlapping phenomena. The purpose of this contribution is to help to clarify some of the issues on the conceptualization, the assessment and the training of metacognition. This symposium focuses on the challenges and potentials of metacognition in mathematics. In a first presentation Panaoura and Demetriou analyse Self-representation in relation to mathematical performance and its impact on strategies pupils use in order to self-regulate their performance on

problem solving. In the next presentation Bracha Karmarski elaborates on Supporting online inquiry based learning in mathematics with meta-cognitive feedback guidance. In addition Opfermann and colleagues analyse how metacognition and hypermedia learning relate. Moreover Tarja-Riitta Hurme and colleagues investigate Metacognition as shared process in networked mathematical problem solving. Finally Desoete elaborates on multi-method assessment of metacognitive skills and the value of teacher ratings in elementary school children.

Self-representation in relation to mathematical performance and its impact on strategies pupils use in order to self-regulate their performance on problem solving
Areti Panaoura, Frederick Institute of Technology, *Cyprus*
Andreas Demetriou, University of Cyprus, *Cyprus*

Research on mathematics teaching and learning has recently moved away from purely cognitive variables. Metacognition and many of its dimensions such as self-representation, self-awareness, self-evaluation and self-regulation have been receiving increased attention in cognitive psychology and mathematics education. The present study concentrated on the impact of pupils' self-representation on the metacognitive strategies they use in order to self-regulate their cognitive performance while trying to solve mathematical problems and on their real mathematical performance on different domains such as counting, geometry and statistics. Participants were 114 pupils (5th grade). Three inventories were developed for measuring pupils' self-representation in mathematics, their performance and the metacognitive strategies they use in problem solving. Results indicated that pupils with high self-representation in mathematics have high performance in specific domains of mathematics, they are more autonomous in the learning procedure and they insist in encountering difficulties.

Supporting online inquiry based learning in mathematics with meta-cognitive feedback guidance
Bracha Kramarski, Bar-Ilan University, *Israel*

Effects of two online inquiry based learning in mathematics are compared: Online inquiry based either to meta-cognitive feedback guidance (MFG) or to no such guidance (NG). The MFG students were exposed to IMPROVE meta-cognitive questioning that serve as cues for solving the problem and features of providing feedback (Kramartski & Mevarech, 2003). A total of 79 eight-grade Israeli students participated in the study. Students were asked to solve online a real-life task and provide feedback to their peers on the solution process. Results indicated that the MFG students significantly outperformed the NG students on online problem solving task, and using conceptual arguments. In addition, the MFG students provided more often mathematical and meta-cognitive feedback by referring to various measures as: Providing mathematical terms, and representations, identifying errors, and clarity of mathematical communication. Theoretical and practical implications of the study are discussed.

Metacognition and hypermedia learning – How do they relate?
Maria Opfermann, Knowledge Media Research Center, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*

During recent years, hypermedia learning environments have gained increasing influence within educational contexts. They offer a high level of learner control together with the possibility to select and combine different representational codes and to access information in a linear as well as in a nonlinear fashion. However, the question needs to be answered whether all learners benefit from such advantages in the same way or whether the relationship between the design of hypermedia environments and learning strategies as well as learning outcomes is moderated by

individual differences, i.e., learner characteristics. In our study, we focus on the role of metacognition, epistemological beliefs, and attitudes for performance, navigational strategies, and representational choices when learning with a hypermedia environment on probability. First results show as expected that learners with sophisticated beliefs and positive attitudes achieve higher performance scores. As for metacogniton, the findings are rather surprising: learners scoring low on the scales we are using are significantly better than those scoring high. Generally, all learners seem to avoid nonlinear navigation and extensive use of representations, independently of their individual characteristics. As the study is still being conducted, final results will be presented at the EARLI symposium.

Metacognition as shared process in networked mathematical problem solving
Tarja-Riitta Hurme, University of Oulu, *Finland*
Kaarina Merenluoto, University of Turku, *Finland*
Pekka Salonen, University of Turku, *Finland*
Sanna Järvelä, University of Oulu, *Finland*

The purpose of this exploratory study was to examine socially shared metacognition in pre-service teachers' collaborative mathematical problem solving supported by Workmates (WM) networked learning environment. Three matched and one lateral group of three students solved mathematical problems in a two hour session four times during the one-month period. The participants solved open and closed problems requiring proportional or algebraic thinking. A stimulated recall group interview was performed immediately after the problem solving situation. Participants' socially shared metacognition during the process was examined in the discussion forum data by using cognitive, metacognitive and social levels of analysis. The analyses were synthesized in a graph of the joint problem solving process as a function of time and compared with the transcripts of the group interviews. From the surface to deeper level, the qualitative content analysis of the participants' computer notes was carried out and the frequencies were calculated. At the cognitive level, the phases of the groups' mathematical problem solving process analysis, exploration, implementation and verifying were examined. In order to examine participants' metacognition, the computer notes were analysed to find the notes where metacognitive knowledge or metacognitive skills were evident. Further, the social processes of joint problem solving were described using the stages of perspective taking consistent with the mathematical problem solving processes: the subjective role taking, reciprocal perspective taking, and mutual perspective taking. In the transcripts of the group interviews the interviewees' utterances I and we were used to diverging individual and shared metacognitive processes.

Children think they know, teachers know they don't know.
Annemie Desoete, Ghent University & Arteveldehogeschool, *Belgium*

This paper focuses on the role of teacher ratings and other assessment techniques on metacognitive skills in mathematics in elementary school children. The skills measured by prospective and retrospective questionnaires and on-line techniques of above average, average and below average mathematical problem solvers were contrasted as parallel measures of metacognition. Child questionnaires seem attractive but not reliable as alternative to picture metacognitive or mathematics skills. Children think they act skillfulness, although they don't. Experienced teachers have a better picture of the metacognitive skills of their pupils. In our dataset metacognitive skillfulness accounted for between 15 and 51% of the mathematics performances, depending on how it is assessed. The choice of diagnostic instruments highly determined the predicted percentage. How you test was what you got. Prediction on-line measured with EPA2000, planning

measured with teacher ratings, monitoring on-line measured with think aloud protocols and evaluation skills on-line assessed with EPA2000 account for 32.4%, 46.2%, 20% and 34.1% respectively of the variance in mathematics performance. Especially planning was closely related to mathematical problem solving in third grade children. Educational implications of the study are discussed.

A 6
28 August 2007 15:00 - 17:00
Room: 2.54 Novobátzky
Symposium

Eye tracking as a means for detailed analyses of multimedia learning processes – Part 1

Chair: **Katharina Scheiter,** University of Tübingen, *Germany*
Organiser: **Katharina Scheiter,** Eberhard Karls University Tübingen, *Germany*
Organiser: **Tamara van Gog,** Open University of The Netherlands, *Netherlands*
Organiser: **Peter Gerjets,** Knowledge Media Research Center, *Germany*
Discussant: **Mary Hegarty,** University of California, Santa Barbara, *USA*

Multimedia learning is defined as building mental representations from materials that involve both verbal (spoken or written text) and pictorial information (static or dynamic visualizations; Mayer, 2005). Many studies on the effectiveness of multimedia learning have been conducted, often inspired by Mayer's cognitive theory of multimedia learning (see Mayer, 2005) and Sweller's cognitive load theory (see Sweller, 2005). However, these studies have mainly drawn conclusions about the cognitive effects of different types of multimedia learning materials based on (transfer test) performance measures, and measures of cognitive load and time-on-task, without directly investigating the processes underlying these effects. Hence, the empirical work presented in this double symposium focuses on detailed analyses of the processes underlying the learning effects of different types of multimedia materials by means of eye tracking. Because eye movement data can provide detailed insight into the allocation of (visual) attention and processing demands, eye tracking is a valuable tool for such studies –albeit one that is little used in educational research. In this double symposium, studies are presented that focus on learning from a variety of multimedia materials that include dynamic visualizations, static visualizations, written text, and narrated text, in varying compositions.

How do learners actually use multiple external representations? An analysis of eye-movements and learning outcomes
Rolf Schwonke, University of Freiburg, *Germany*
Alexander Renkl, University of Freiburg, *Germany*
Kirsten Berthold, University of Freiburg, *Germany*

Although multiple external representations can have benefits, especially for learning complex and new ideas, they are often not as effective as expected.. The present study employs eye tracking methodology to take a closer look at how learners use different external representations in learning from worked examples, how these activities are related to learning outcomes, and how well intended cognitive functions of multiple representations match to the functions as perceived by the learners. 16 (predominantly psychology) students studied worked examples on the application of probability principles, each consisting of a text (the problem formulation), an equation (representing the solution), and a tree diagram (that was intended to mediate between the concrete text and the highly abstract equation). During the learning phase the gazes of the participant were recorded. After the learning phase, the participants saw a gaze replay of their viewing behavior and were asked to think-aloud. The distribution of fixation durations on different representations indicates that single representations were not neglected. Rather, the participants switched

frequently between different external representations which might indicate that they are not processed independently from one another. Yet, transitions between representations were not per se beneficial. For example, transitions between diagrams and equations were valuable only for learners with better learning prerequisites. For learners with poorer learning prerequisites, frequent transition obviously indicated mapping difficulties. For all learners, frequent transitions between equation and text were dysfunctional, pointing to the mediating function of the diagrams. Hence, the function of transitions seems to depend on characteristics of the learners as well as on characteristics of the representations involved. Finally, the verbal protocols revealed a mismatch between intended and perceived functions. The results suggests to inform learners more fully of the intended functions and/or to make the intended functions more salient.

Prior knowledge and interactive overview structure effects on cognitive load, disorientation and learning

Franck Amadieu, University of Toulouse-Le Mirail, *France*
Tamara van Gog, Open University of the Netherlands, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*
Andre Tricot, University of Toulouse-Le Mirail, *France*
Claudette Marine, University of Toulouse-Le Mirail, *France*

This study investigated the effects of the structure of an interactive conceptual map and the level of learner's prior knowledge on their disorientation, cognitive load, and learning. The content to which the interactive conceptual map gave access was a text on the life cycle of a retrograde virus (HIV). Two types of map structures were designed: (a) low level of structure; a network that displayed the main concepts in an unstructured fashion, and (b) high level of structure; a hierarchical structure that displayed the same concepts according to categories of the domain. Eye movements were recorded during the first minutes of task performance. The results revealed that the hierarchical structure supported a better knowledge gain of factual knowledge and conceptual knowledge. But the hierarchical structure entailed higher conceptual learning (comprehension of relationship between concepts) only for low prior knowledge learners, whereas it entailed better factual knowledge learning (information specific to a concept - factual knowledge) only for high prior knowledge learners from the hierarchy focusing on details information. The results showed also for all participants an important cognitive load (i.e. disorientation and complexity perceived) entailed by the network structure compared to the hierarchical structure. Analyses of the eye movement data showed that the average fixation duration was higher for the hierarchical compared to the network structure. Interestingly, correlation analyses revealed that the average fixation duration was negatively correlated with the mental effort ratings and disorientation scores, but only within the network structure condition.

Understanding text and picture content as a unity

Niels Heie, The Graphic Arts Institute of Denmark, *Denmark*
Karen Margrethe Oesterlin, The Graphic Arts Institute of Denmark, *Denmark*
Frank Christensen, The Graphic Arts Institute of Denmark, *Denmark*

Multimodality is at the heart of modern visual communication products. The combination of pictures and words as a mean of visual expression assumes reader behavior to include the reading of pictures on the same level as the reading of words. The dual coded message should be dual coded interpreted. Our experiment tested 24 adult persons choice of sentences intended as captions to pictures. 12 pictures, each one with three sentences as a captions possibility were presented to test persons in two different layouts: one with a single picture, another with three copies of the

same picture. Test persons were eye-tracked while they decided which combination contentwise could be considered most objective and most subjective. Analysis of time spenditure showed that test persons used app. 25% more time on the subjective than on the objective task. Time used on each task was overall the same, but in three-picture layouts testpersons used more time at pictures than at answers, in one-picture layouts more time at answers than at pictures. App. 92% of choices for the objective content relation were as foreseen, app. 77% for the subjective. The experiment showed that interdependedness should be considered when making visual communication and that both layout and complexity of content influences the behavior of the reader.

Are there age differences in utilization of illustrations in reading science textbooks?
Oddny Judith Solheim, University of Stavanger, *Norway*
Marianne Roskeland, University of Stavanger, *Norway*
Per Henning Uppstad, University of Stavanger, *Norway*

This project aims at studying how students in two different age groups read science textbooks with illustrations. By tracking their eye-movements one may register how much time these groups use on the plain text on one side and the illustrations on the other, and one may search for patterns in how – or if – they switch between the two modalitites. Literature on iconotext or multimodal text is widely based on assumptions that are not well documented with regard to eye-movements during reading of such text. Our project can be regarded as a modest start in getting at some such information. In a study of high- and low-achievers Hannus and Hyßnä (1999) found differences in how children integrated text and illustrations. In the present study we investigate differences between children of different age groups.

Newspaper reading, eye tracking and multimodality
Kenneth Holmqvist, Lund University, *Sweden*
Jana Holsanova, Lund University, *Sweden*
Nils Holmberg, Lund University, *Sweden*

Readers' visual interaction with multimodal documents has been investigated in four eye-tracking studies on newspaper reading. Multimodal documents are divided into information graphics and articles containing text, photos and photo captions. Analyses of eye movement data from two experimental studies show that spatial layout of information graphics affects reading style, amount of reading, and fixation order. Results from one study shows that the amount of reading in information graphics is positively correlated to the comprehension of information graphics. In the case of news articles containing photos, two studies provide evidence that photo size and photo content have no general significant effect on reading time of related textual content. Analyses of scanpaths between picture objects and text objects within the same newspaper article show that text elements such as headlines and intros are fixated first, followed by a large number of transitions to pictures, and thereafter a large number of transitions to article text. Experimental results from one study show that short text length and easy text difficulty in articles are positively related to reading depth and article comprehension.

A 7
28 August 2007 15:00 - 17:00
Room: 3.67 Békésy
Symposium

Conversation analysis as a way of studying learning in interaction

Chair: **Fritjof Sahlström,** Uppsala University, *Sweden*
Organiser: **Fritjof Sahlström,** Uppsala University, *Sweden*
Discussant: **Ference Marton,** University of Gothenburg, *Sweden*
Discussant: **Ingrid Carlgren,** Stockholm Institute of Education, *Sweden*

The symposium "Conversation Analysis as a Way of Studying Learning in Interaction" argues that learning as a socially constituted phenomenon can be systematically studied through the close analysis of interaction provided by the perspectives and techniques of Conversation Analysis, or CA. The symposium not only argues that CA makes possible a precise pinpointing of learning in interaction, but demonstrates how learning can be studied empirically, within interaction, focusing on the practices that learners use to display their orientation to objects and processes for learning. The papers contributing to the symposium, are drawn from a wide range of educational settings (teaching of English as a second language to adults, academic supervision, pilot training for upper secondary students, adult physiotherapy encounters and teenagers playing video games). All papers use video and audio recordings of interaction occurring in naturalistic settings, and use well established CA techniques for the analysis. The studies all empirically demonstrate how learning is oriented to, displayed, and constituted in the studied interactions, in particular in relation to the recognition of, and procedures for resolving, disfluencies or 'troubles' in an interaction, thus providing new knowledge to their respective fields. Of general interest is that all papers have found demonstrable longitudinal changes at different levels in the learner's performance of the studied actions, changes which were socially established and upheld, and can be considered as direct empirical evidence of learning, and of how learning comes about. In being able to show this, the symposium contributes to the field of research on learning as changing participation in social activity , and to the rapidly growing field of conversation analysis research on teaching and learning, both in general and specifically in relation to how 'troubles' of different kinds in interaction provide resources for learning.

Language learning seen in practices for repair
John Hellermann, Portland State University, *USA*
Christiane Bongartz, University of Koeln, *USA*

Using methods developed in ethnomethodological conversation analysis (Pomerantz & Fehr, 1997), this research draws on a large corpus of video recordings of language classrooms to study the development of practices for repair by adult learners of English. The data come from a corpus of almost 4,000 hours of classroom video recordings in which classrooms were recorded with 6 cameras and five microphones every day for four consecutive years (Reder, Harris, & Setzler, 2003). Two of the cameras in each classroom were mobile and focused on two learner-learner dyads engaged in task interaction. The presentation focuses on one learner, a female college-educated immigrant-learner from Mexico, "Inez" who attended classes at the data collection site and was recorded for 5 consecutive ten-week terms. The research takes advantage of the large source of data and innovative technology to move beyond previous conceptions of language learning through interaction through a data-driven method that uncovers language practices that

are oriented to by the participants and which facilitate language use and development. The detail in face-to-face peer interaction uncovered by two mobile cameras' focus on dyadic tasks along with the length of data collection allow for the phenomenon of repair to be seen both as a local resource for the microgenesis (Korobov & Bamberg, 2004) of learning a new language and a site for understanding learning over time. Findings show that practices for repair are used by learners to facilitate interpersonal interaction and to negotiate language structure both in task-directed and conversational genres. Over time, practices for repair develop as part of a learner's repertoire for interaction in the new language. Inez's repertoire developed to include repair types noted in previous research on native speaker interaction such as 'open-class' repairs (Drew, 1997).

Studying learning as changing participation in doing repair – the relevance of situational context
Cathrin Martin, Department of Education, Uppsala university, *Sweden*

The aim of the reported research is to address how learning is constituted through longitudinal changes in the way participants take part in doing so called repair in relation to a learning task. A particular focus is the relevance of how the situational context is oriented to by participants. This research has been carried out against the background of understanding learning as interactional in nature. Repair is an "understanding-display device" by which participants have the possibility to check, correct and query their local understandings in interaction as it unfolds. It is a distinct and orderly process whereby participants on a turn-by-turn basis orient to a problem or difficulty in a turn, make relevant what the problem is, and try to solve it. As such repairs are observable and possible to explore. The data material consists of longitudinal video-recorded naturally occurring physiotherapist-patient encounters. A detailed analysis and description is made possible through the use of perspectives and methods found within conversation analysis. The findings show that a change in participation is evident as a gradual stepwise change in the "doings of repair" over time from the physiotherapist to the patient regarding who is responsible and in control of detecting and solving the problems. The relevance of the situational context is captured as shorter and shorter alternating miniature cycles of change in this progressive change in the organisation of repair. A continuous re-contextualisation of relevant local understanding and skill in relation to the learning task is particularly evident in these cycles when a new aspect or component of the task is introduced. Findings provide empirical support for demonstrating that culturally broad changes in an activity ultimately have their origin in the smaller changes in people's participation in activities of everyday life.

Learning to fly – the progressive development of situational awareness
Helen Melander, Department of Education, Uppsala university, *Sweden*
Fritjof Sahlström, Department of Education, Uppsala university, *Sweden*

This paper investigates how situational awareness is constituted in the moment-to-moment interaction between a student learning to fly an airplane and her teacher, and how the student learns situational awareness, i.e. the ability to analyse a situation so as to provide ground for informed decisions about next actions. In the paper, a view of situational awareness as an interactional on-going accomplishment is proposed. The paper demonstrates how situational awareness is socially established and learned in briefing sessions, in flight lessons in the actual airplane, and in debriefing sessions. Learning is approached from within a conversation analytic (CA) perspective, building on prior CA research on the organisation of human interaction. The empirical material consists of video recordings of flight lessons. Three students were followed and recorded during a series of briefing sessions, flight lessons and debriefing sessions. The studied task concerns situational awareness in recovering from abnormal attitudes. The results show that in

the moment-to-moment constitution of situational awareness the participants rely both on information provided from the instruments, and on how it should "feel" when recovering. Further, the results show how there are micro-longitudinal changes in the student's performance of the recovery from the abnormal attitudes – both within the same flight lesson and over the course of the three lessons. These changes are socially established and upheld, in interaction between the student, the teacher and the airplane controls and instruments. Problems in the pilots' situational awareness are often reported as a significant contributing factor to airplane accidents. This study furthers the understanding of situational awareness as an interactional accomplishment and sheds light on how situational awareness is learned in the interaction between student and teacher, in the different educational contexts.

Opportunities for learning: repetition and imitation as procedures for participation in the activity of playing video games

Arja Piirainen-Marsh, Jyväskylä University, Department of Languages, *Finland*
Liisa Tainio, Helsinki Collegium of Advanced Studies, *Finland*

Recent studies have argued that computer and video games can be used to facilitate learning in schools and homes (Gee 2005). This paper examines interactions of teenage boys playing video games in order to shed light on the opportunities the play activity presents for learning English as a second language. The data are drawn from c. 13 hours of interactions where Finnish teenagers play a Japanese role play game translated and localised into English. The methodological approach is Conversation Analysis, drawing in particular from the study of L2 learning as embedded in interactional activities (e.g. Mondada & Pekarek Doehler 2004). The aim of the study is to show how repetition and prosodic imitation serve as interactional practices through which players attend to, draw upon and appropriate the language of the game in order to participate in the activity. In SLA theory repetition has been linked to the development from controlled language use to more spontaneous and automatic production (see e.g. Skehan 1998). Research from first and second language learning contexts also shows that repetition and prosodic imitation are frequent and multi-functional practices which can be used to build affective stance (Duff 2000) and to engage in collaborative language play (Cook 2000, Cekaite & Aronsson 2004). We examine repetition and prosodic imitation of game characters' turns as practices through which players create opportunities for co-participation and build their stances towards current events. Analysis of different types of environments where repetition occurs reveals their potential for learning: the findings suggest that repetition and prosodic imitation offer opportunities for practising routines, experimenting with new language forms, engaging in language-play, displaying activity-specific expertise and meta-linguistic knowledge, and spontaneous L2 use. Practices of repetition hence serve as an interactional resource for learning through successful co-participation in the play activity.

Problems in the research problem: criticism and resistance in supervising of master's thesis

Sanna Vehvilainen, Department of Education, Helsinki University, *Finland*

The aims of this study are to examine the interactional organisation of critical feedback in academic supervision on master's thesis, and to analyse the production of misalignment in such situations. The study shows how supervisees systematically resists changes in a potential learning-relevant action, and demonstrates there are interactional reasons for this. The study is part of a larger conversation analytic research on feedback in academic supervision. This study focuses on a particular feedback situation where the teacher passes to the student a fundamental criticism that the thesis-in-progress lacks a proper research problem. Such criticism from a teacher constitutes a

highly consequential situation for the student's learning. However, it also constitutes a face-threat, and resistance is a likely response. Two case analyses were carried out on the 'missing problem - criticism' (MPC), using the method of conversation analysis. Two distinct sequential patterns of presenting the MPC were observed: one more confrontative, the other more cautious. In both cases the student persistently misaligned with the MPC, using different strategies. The study presents an analysis on the interactional possibilities available for the participants in these cases, as well as on the different strategies of resisting the criticism, managing student resistance, and pursuing the MPC. This study contributes to the body of empirical knowledge on feedback, resistance and management of resistance in institutional settings. As CA research on learning, the study provides an analysis of how lack of shared focus in interaction is maintained by participants and demonstrates that there are local interactional reasons for non-understanding and thus, hindrance to learning. Furthermore, it is shown that the thesis drafts may be used in the interaction in ways that significantly facilitate student resistance. The various pedagogical implications of this finding are discussed

A 8
28 August 2007 15:00 - 17:00
Room: 1.58
Symposium

New conceptual frameworks in personal epistemology: Developing potentials for learning in classroom

Chair: **Florian Haerle,** University of Nevada, Las Vegas, *USA*
Organiser: **Florian Haerle,** University of Nevada, Las Vegas, *USA*
Discussant: **Lisa Bendixen,** University of Nevada, Las Vegas, *USA*
Discussant: **Joanne Brownlee,** Queensland University of Technology, *Australia*

Most of the existing conceptual frameworks in the field of personal epistemology (i.e., conceptions about knowledge and knowing) emerged from research on college students, while personal epistemologies in children and adolescents often remain unaddressed. Furthermore, these frameworks do not specifically account for learning and instruction and, therefore, do not develop potentials for classroom learning. Today's cutting edge research investigates the personal epistemology of students in preschool through secondary schools, and signifies the relevance of personal epistemology in learning and instruction. This symposium aims to: (1) introduce new conceptual frameworks in personal epistemology that account for learning and instruction, (2) bring together leading edge research on preschool through high school students' personal epistemology and teachers' personal epistemology, and (3) (re)examine existing and new frameworks in their relevance for learning potentials in classroom education.

A framework for investigating the origins of epistemic development in very young knowers
Barbara K. Hofer, Middlebury College, *USA*
Leah Wildenger, University of Syracuse, *USA*
Jean Burr, Hamilton College, *USA*

Research on episte mic beliefs and development has focused largely on college students until recent years, and the expansion to younger ages permits the possibility of a broader framework for

understanding the origins of epistemic development. In this presentation we will discuss recent studies from our lab, investigating theory of mind and epistemic development in very young knowers. We will focus primarily on a recent interview study of 37 3-5 year olds that addresses domain specificity in epistemic reasoning in regard to four domains: morality, fact, ambiguous fact, and taste. We will conclude with suggestions for future research and implications for early childhood education.

The educational model for personal epistemology: Epistemic climate in elementary classrooms
Florian Haerle, University of Nevada, Las Vegas, *USA*

Integrating the empirical and theoretical frameworks on personal epistemology in the fields of Educational Psychology and Curriculum and Instruction, I developed the Educational Model of Personal Epistemology (EMPE) that accounts for teachers' and learners' personal epistemology and the epistemological underpinnings of instruction and curriculum, and their interrelation in educational contexts. In this presentation, EMPE will be used to describe epistemic climate in elementary classrooms. In that, the model will be (a) further developed, (b) situated in the elementary classroom context, and (c) grounded in current research on personal epistemology. In the first part of the presentation, epistemic climate is theorized in accordance with EMPE. It describes the nature of knowledge and knowing in classrooms emerging from the personal epistemologies of (1) students, and (2) teachers, as well as from the epistemological underpinnings of (3) knowledge representations (e.g., curricula), (4) teaching instruction, and their reciprocal relations. In the second part, existing research on personal epistemology in German and American fourth- and sixth-Grade classrooms will be drawn upon to ground the proposed model in empirical data. In the final part, the model's implications will be discussed with regards to classroom education, teacher education, curriculum development, and educational research.

Exploring the relationship between students' mathematics-related beliefs and the classroom culture
Erik De Corte, University of Leuven, *Belgium*
Lieven Verschaffel, University of Leuven, *Belgium*
Fien Depaepe, University of Leuven, *Belgium*
Peter Op 't Eynde, University of Leuven, *Belgium*

Over the past two decades the study of students' and teachers' mathematics-related beliefs has received gradually more and more attention from researchers in the field of educational psychology as well as from scholars in the area of mathematics education. In this paper positive beliefs about mathematics and mathematics learning will be considered as a major component of competence in mathematics. Results of empirical studies will be presented showing that primary school students often have negative and naive beliefs about mathematics learning, focusing thereby on the phenomenon of 'suspension of sense-making' in mathematical problem solving. A design experiment will then be described in which a learning environment was developed and implemented that aims at improving students' performance in problem solving as well as fostering their mathematics-related beliefs. This and related work supports the hypothesis that changes in the classroom culture and practices can foster students' mathematical thinking and learning as well as their beliefs, but they do not provide a more in-depth understanding of how the interaction processes and patterns in the classroom influence their math learning in general and their mathematics-related beliefs in particular. Using as a theoretical framework a socioconstructivist perspective, a recent investigation will then be reviewed which precisely attempts to contribute at unraveling the reciprocal relationship and impact between students' beliefs, on the one hand, and

crucial components of the learning environment, especially teachers' beliefs and the classroom culture. Some critical reflections and suggestions for future inquiry will conclude the presentation.

The development of scientific reasoning in the informal context and personal epistemology among young thinkers
Fang-Ying Yang, National Taiwan Normal University, *Taiwan*
Chin-Chung Tsai, National Taiwan University of Science & Technology, *Taiwan*

In this paper, we attempt to develop a theoretical framework based on empirical data obtained from children and teenagers, linking scientific reasoning in informal context with the development of personal epistemology. The scientific reasoning discussed in the study concerns the coordination of theory and evidence and reflective thinking that are critical to the decision-makings in everyday situations. To achieve this aim, comparisons are made on the modes of reasoning between students of 6th, 8th and 10th grades in evaluating science-related in-dispute issues, and then cross analyzed the reasoning modes with the dominating personal epistemology at each age. Based on the analyses of the study, a dynamic framework concerning the development of scientific reasoning in the informal context and personal epistemology was proposed.

A 9
28 August 2007 15:00 - 17:00
Room: 1.60
Symposium

Teachers' and prospective teachers' development of values, democratic and moral education

Chair: **Nava Maslovaty,** Bar Ilan University, *Israel*
Organiser: **Nava Maslovaty,** Bar Ilan University, *Israel*
Discussant: **Cees Klaassen,** Radboud University, *Netherlands*

The aims of the symposia are to present potential educational strategies, contents and frameworks for the development and empowerment of values, democratic, and moral education in multicultural societies. Despite the clear importance of promoting and constructing these areas in educational systems, patterns for measuring achievements in these behavioral areas have never been consolidated. One reason for this may be the difficulty in measuring them. Another reason may be the postmodern idea that in a pluralistic society, it is an individual matter that changes according to circumstances, personality, ideas and aspirations. Four studies from three countries will be presented at the symposium. The first two papers, "The taxonomy of the affective domain as perceived by education students :confirmation and expansion" and "Swedish teacher students' views on human dignity and mankind" deal with prospective and practicing teachers studying at the university, while the last two papers: "Values at stake: Teachers' stories" and "Acculturation processes in school and their contribution to adaptation of immigrant youth" deal with teachers in varied educational frameworks who cope using different contents and strategies. The authors suggest several useful insights and methods for developing and empowering prospective and practicing teachers toward the intriguing field of social literacy.

The taxonomy of the affective domain as perceived by education students: Confirmation and expansion
Mordechai Miron, Tel Aviv University, *Israel*
Nava Maslovaty, Bar Ilan University, *Israel*
Arie Cohen, Bar Ilan University, *Israel*

Despite the clear importance of affective learning in educational systems, patterns for measuring achievements in this behavioral area have never been consolidated. In traditional and modern educational systems, the importance of examining cognitive achievements is well known, however testing methods for measuring achievement in the affective domain have rarely been developed. The pluralism of western society fosters the belief that the affective area of behavior is an individual matter. An additional factor is the difficulty in measuring it. "The Taxonomy of Educational Objectives - the Affective Domain" (Krathwohl, Bloom & Masia 1964), contains a basic description of five levels of behavior in the affective domain. The structural principles underlying the affective hierarchy are the internalization and developmental stages, from passive and dependent to active and autonomous. The categories of the affective taxonomy are Receiving; Responding; Valuing; Organizing; Characterizing. A written questionnaire was administered to 170 university students in the School of Education during the 2004 academic year. 33% of the students work as teachers. The anonymous questionnaire included background variables and attitudes toward 60 student traits on a 5-point Likert scale. In this paper, we report on the 21 social traits only. A smallest space analysis was performed. The space was polarized into three facets: the goals of education, objectives and context. The perception of "ideal student" traits represents the teachers' belief system. The study confirmed the structure of the affective domain of the taxonomy. In the analysis, we found two additional areas: the expression of feelings and general social characteristics. Our results show that the education students mastered the affective domain stages. However, the issue of applying these in the classroom needs to be studied further.

Swedish teacher students' views on human dignity
Anna Tapola, University of Kalmar, *Sweden*

Democracy and certain fundamental values – inviolability of human life, individual freedom and integrity, equal Menschenwýrde, etcetera – are supposed to form the basis of the Swedish school system. However, what human dignity and Menschenwýrde exactly mean is far from clear. Instead the literature on dignity seems to be full of controversies and alternative distinctions. Still these concepts are supposed to be of fundamental importance in education – in Sweden as well as in other countries. Consequently, if these fundamental values are seen as social constructions, the meaning must be investigated and clarified. This study aims to analyse Swedish teacher students' apprehensions of what human dignity and Menschenwýrde mean in relation to three different stages; life of the unborn, life between birth and death, and human dignity after death. The material consists of students' letters where they discuss issues in focus in this inquiry. A qualitative approach is applied in the study and the analytical tool is based on Fairclough's three-dimensional model for critical discourse analysis. The findings are analysed in context of legislation and policy documents. Findings show a variety of standpoints among the teacher students, which indicate diverse notions of what human dignity and Menschenwýrde mean. However, there are some thematic reappearances in the letters: threats towards Menschenwýrde, human dignity related to disabilities, health and various diseases, pros and cons with regard to abortion and foetus development, and above all, human dignity and Menschenwýrde in relation to democracy and every-day school practice. This thematic homogeneity also includes some heterogeneousness, especially when it comes to position-taking, which indicates that several

competitive sub-discourses are present under the roof of a main discourse of Menschenwýrde. The present ideological impacts and order of discourses will be specified and presented at the conference.

Values at stake: Teachers' stories
Sofie Maas, Radboud University, *Netherlands*
Cees Klaassen, Radboud University, *Netherlands*

Our research is about morally critical situations that teachers are confronted with during their daily practice: situations in which students do or say things that impinge on moral values. Teachers' reactions to these situations are of importance to students' moral development. By the way teachers act, they, implicitly or explicitly, send a message to their students about what is important in the way people interact with others. Eleven teachers from five different schools of general education in the Netherlands were questioned about morally critical situations that they had been confronted with. During in-depth interviews the teachers were asked about their experiences of these situations and about the way they had acted when they had come across such a situation. In particular, we wanted to gain insight into teachers' reasons for acting the way the did. Among other things, our research points to the importance of teachers' personal moral values. During our presentation we will show how teachers' moral values are reflected in their emotions and actions and the reasons they provided for their actions when confronted with a morally critical situation.

Acculturation and adaptation processes of immigrants youth in school
Eli Shitreet, Bar Ilan University, *Israel*
Yaacov Iram, Bar Ilan University, *Israel*
Nava Maslovaty, Bar Ilan University, *Israel*

The aim of the study was to examine the contribution of different approaches to the absorption of new immigrants in the school framework to the adaptation of Ethiopian born adolescents in youth villages. Tattar et al. (1994) maintain that the model adopted by the school in dealing with new immigrants will affect their absorption. Schools that adopt the integration approach, perceive absorption of new immigrant pupils as central to their operation, perceive enrollment of immigrant youth to the school as a directional change and implement an initiating strategy (innovative-active model) - will deal more successfully with the absorption process than schools that strive to assimilate the new immigrants, perceive absorption of new immigrants as a marginal issue, perceive the enrollment of immigrant pupils as an additive change and operate according to a conventional strategy (conservative-passive model). Sample: 150 Ethiopian-born adolescents who studied in five youth villages and a day school, and 120 teachers teaching in these schools. Instruments: A questionnaire for examining models for the absorption of immigrant pupils; an educational framework adaptation questionnaire (Shitrit, 2006). Findings: In schools operating according to the innovative-active model, the study showed higher levels of social and scholastic adaptation among immigrant pupils compared to schools operating according to partial models. With respect to the level of behavioral adaptation, no significant difference was found between the schools. Our findings are supported by Berry (1990), who claim that, despite the significant advantages of the integration model, it is found in only few schools. In our study, only two of the six schools were found to operate according to this model. The social adaptation level of immigrant pupils in these schools was found to be very high.It is recommended to implement special programs aimed at integrating immigrant pupils.

A 10
28 August 2007 15:00 - 17:00
Room: 7.14
Symposium

Working memory in children with special educational needs

Chair: **Johannes Van Luit,** University Utrecht, *Netherlands*
Organiser: **Johannes Van Luit,** University Utrecht, *Netherlands*
Discussant: **Pirjo Aunio,** University of Helsinki, Faculty of Education, Depa, *Finland*

In the field of special educational needs specific groups of atypically functioning children are more and more involved in experimental designs. Several studies have shown that these groups of children suffer from working memory problems. Working memory is referred to as a system in which information can be temporarily stored and manipulated so as to support ongoing complex cognitive activities, such as reading, arithmetic and listening. The complexity of this construct is illustrated by the working memory model proposed by Baddeley (1986). This model consists of three components coined the 'phonological loop', the 'visuo-spatial sketchpad´, and the 'central executive'. Unfortunately, little is known about the functioning of working memory in atypically functioning children. There are only a few studies available applying the Baddeley model to working-memory function in atypically functioning children. Therefore in this symposium we are focusing on working memory in specific groups of atypically functioning children. In the study of Býttner and colleagues working memory has been studied in children with attention deficit hyperactivity disorder, in the study of Mähler and Schuchardt children with learning disabilities were involved, in the study of Van der Molen and colleagues adolescents with mild intellectual disabilities were studied, the study of Lanfranchi and colleagues focussed on children with Down syndrome and Fragile X syndrome were studied. The primary goal of these studies was to exam working-memory function in these children by presenting them multiple assessments of both the phonological loop and/or the visuo/spatial sketchpad, CE components of the Baddeley model. All four studies present working memory strengths and weaknesses for the atypically functioning groups of children and reflect on the consequences of their working memory for learning.

Working memory in children with ADHD: Is the central executive impaired?
Gerhard Büttner, University of Frankfurt, Institute of Psychology, *Germany*
Sabine Machowski, University of Frankfurt, Institute of Psychology, *Germany*
Adriana Oppitz, University of Frankfurt, Institute of Psychology, *Germany*
C. Stadler, University of Frankfurt, Institute of Psychology, *Germany*

Children with attention deficit hyperactivity disorder (ADHD) have difficulties in sustained attention, regulation of activity level, and impulse control. In spite of a large body of empirical research on ADHD, the nature of the disorder is not well known. The aim of the studies reported here was to further explore the hypothesis that ADHD is a disorder of executive functions. On the basis of Baddeley's model of working memory it was investigated whether children with ADHD (ICD-10 diagnosis F90.0 or F90.1) are impaired in inhibition and in the capacity of the central executive. In three studies, eight to eleven year-old children with and without ADHD completed a go-/no go-task, an Implicit Association Test (IAT), and a dual task. In the first study, reaction time, variability of reaction time, and number of commission errors were similar in both groups. In the second study, the ADHD children had a higher variability of reaction time and a higher rate of commission errors. In the third study, ADHD children differed from their peers in the visuo-spatial

hidden figures task. The results provide mixed support for the assumption that ADHD children's central executive is impaired. In the simple go-/no go-reaction task no evidence for an inhibition deficit in ADHD children could be found. In the more complex IAT-task the ADHD children had a higher rate of commission errors which can be interpreted as an indicator for a deficit in behavioural inhibition. In the dual task, ADHD children were not more severely impaired by the dual task condition than control children. In sum, the results of the three studies show that children with ADHD have no general impairment of the central executive.

Working memory functioning in children with learning disabilities: The role of intelligence
Claudia Mahler, Georg-August-University of Gottingen, *Germany*
K. Schuchardt, Georg-August-University of Gottingen, *Germany*

Children with learning disabilities are identified by their severe learning problems and their deficient school achievement. Sub-average results in standardized tests of reading, writing and mathematics are the critical criteria. As long as these children perform on average in an intelligence test and there is a significant discrepancy between (normal) intelligence and (sub-average) reading-, writing- and mathematical competencies, the focus is on the disorders of scholastic skills. However, children with sub-average school achievement and sub-average intellectual development are supposed to suffer from intellectual disabilities rather than from learning disabilities. The open question is whether these two groups are characterized by different cognitive functioning. This question is examined in a study in which several functions of working memory were explored. A working memory battery with tasks for the phonological loop, the visual-spatial sketchpad and central executive skills was presented in individual sessions in three specific groups of typically or atypically functioning students. Results reveal an overall deficit in working memory of the two groups with learning disabilities as compared to the control group. However, unexpectedly, there were no differences between the two disabled groups. This finding does not support the notion of discrepant cognitive functioning due to differences in intelligence of these two groups. In the ongoing discussion about the role of intelligence, especially about the postulated discrepancy between intelligence and school achievement for diagnosis and special education, our findings might lead to rethink the current practice of treating these two groups as fundamentally different.

Working memory and short-term memory in children with Mild Intellectual Disabilities: Strengths and weaknesses
Mariet van der Molen, University Utrecht, *Netherlands*
Johannes Van Luit, University Utrecht, *Netherlands*
Marian Jongmans, University Utrecht, *Netherlands*
Maurits van der Molen, University of Amsterdam, *Netherlands*

Working memory is considered crucial for scholastic and cognitive functioning. Not much is known about how it functions in children with mild intellectual disabilities (MID). Therefore, this study focuses on these children's functioning of verbal and visuo-spatial working memory and of verbal and visuo-spatial short-term memory. Forty-nine children with MID (IQ 55 – 85, mean age 15 years) were compared to 39 typically developing children (mean age 15 years) and to 29 younger typically developing children (mean age 10 years) on a wide variety of working memory and short-term memory tests. The children with MID performed less well on all tests in comparison with the typically developing children of similar age. Compared to the younger typically developing children, the children with MID did worse on Nonword Recall, the Corsi test, Listening Recall and Backward Digit Reacall, but not on Digit Recall, the Visual Patterns test and

the Odd-One-Out. Within the MID group, we found three distinct clusters each performing differently on the administered tests. Children with MID seem to have a specific verbal working memory deficit. However, apparently different subgroups exist, each having its own memory strengths and weaknesses. These findings hold implications for how to communicate to children with MID within and outside the classroom.

Verbal and visuo-spatial working memory in Down syndrome and in Fragile X syndrome
Silvia Lanfranchi, University of Padova, Department of Developmental, *Italy*
Cesare Cornoldi, University of Padova, Department of Developmental, *Italy*
Renzo Vianello, University of Padova, Department of Developmental, *Italy*

The main aim of this study, is to analyse working memory (verbal, visuo-spatial and control components) in Down and in Fragile X syndromes. In order to analyse them, on the basis of the literature, a battery of three verbal and three visuo-spatial working memory tasks, requiring different degrees of control and suitable for individuals with mental retardation, was composed. Data show a non homogeneous working memory impairment in the considered syndromes. In fact, the results of the four studies carried out lead to think that in both syndromes some components functioning (visuo-spatial sketch pad in Down syndrome, phonological loop and visuo-spatial sketch pad in Fragile X syndrome) is coherent with mental age, while other component functioning (phonological loop and central executive in Down syndrome, central executive only in Fragile X syndrome) is lower than we would expect on the basis of mental age. Results support also the hypothesis that some of these deficits are syndrome-specifics, while others are a consequence of mental retardation. Moreover, results of study 1 and 2 lead to analyse, in study 3 and 4, the relationship between specific patterns of memory strength and weakness found in Down syndrome and others aspects of the cognitive profile of this syndrome. Results support the hypothesis that the verbal working memory deficit in Down syndrome is independent, in its origin, from the verbal abilities deficit that often characterize this syndrome. However, correlation values between verbal working memory performance and verbal abilities scores show a relationship in Down syndrome. It is possible to hypothesize a reciprocal influence between these abilities. This hypothesis is also supported by many findings in studies carried out with typically developed children.

A 11
28 August 2007 15:00 - 17:00
Room: 0.89 Jedlik
Symposium

Motivation and efficient learning with multimedia or web-based learning environments

Chair: **Nathalie Huet,** University Toulouse 2, *France*
Chair: **Caroline Dupeyrat,** University Toulouse 2, *France*
Organiser: **Nathalie Huet,** University Toulouse 2, *France*
Organiser: **Caroline Dupeyrat,** University Toulouse 2, *France*
Discussant: **Susanne Narciss,** University of Dresden, *Germany*

Self-regulation and students' autonomous task in a web-based learning environment
J. Reinaldo Martinez-Fernandez, Universidad Autonoma de Barcelona, *Spain*
Samuel Rabanaque Agudo, Universidad Autonoma de Barcelona, *Spain*

This work analyses the relationship between self-regulation processes and the autonomous task participation of undergraduates that studied a specific content course in psychology of attention and perception. The aim of this study was to analyse the relationship between self-regulation processes and participation in autonomous task in a web-based learning environment. The participants were 53 Psychology undergraduate beginners from the Universidad Autônoma de Barcelona (Spain). Teaching and learning processes were developed on a web-based learning environment. Afterwards, the students answered a set of on-line questionnaires in order to inform us about their self-assessment of their self-regulatory activities and own participation level. The sample was divided (into low and high self-regulation) based on their self-regulation processes and a function of the cluster analysis. The differences between these two classifications were in constructivist conception of learning, intrinsic orientation, and metacognitive strategies use. The results show that there are significant differences in favour of the high level of self-regulation. The differences were observed in interest, motivation, satisfaction, active performance and learning according to the undergraduates' self-assessment. Other findings in relation to self-regulation processes showed that: 1) there are intermediate levels in each category about conceptions of learning; 2) there is an intermediate level in the use of metacognitive strategies but the score in planning subscales strategies is significantly higher than in the control-checking subscale; and 3) there is a high level in intrinsic orientation. Additionally, the cognitive variables in the self-regulation construct have significant relationships between each other, in particular the constructivist conception of learning and metacognitive strategies. With regard to motivation, only self-efficacy explains differences in the students' self-assessment of those who consider themselves active in their learning processes.

The frequency of use of ICT: Impact on motivation toward science
Roy Normand, University of Montreal, *Canada*
Roch Chouinard, University of Montreal, *Canada*
Jesus Vasquez Abad, University of Montreal, *Canada*

The aim of this study is to examine the relation between the frequency of use of computer (different types of use) and motivational attitudes in science. ICT is omnipresent in the 21st

century school. Students use them in many situations (DeBell and Chapman, 2006). It's undeniable that ICT have a lot of influence and impact on student academic behaviors. Most recent researches (Beltran, 2006; OECD, 2003) showed that students who used regularly computer or have a computer at home perform better in key school subjects. To achieve the aim of this study, several auto-reported attitudes scales and socio-demographic questions were administered to a sample of about 400 French-Canadian students (boys and girls) from five junior high-schools in grade 8th at the beginning of the school years. Our results showed that student who reported using ICT (personal and educational uses) more often have also better motivational attitudes. Moreover, students that use ICT only for fun use (like email, chatting and playing) have equivalent or lower attitudes than students who rarely use ICT. Interestingly, it's seems that is not enough to use ICT, but a good variety of use of ICT could be related to good motivational behaviors in science.

Differential effects of a blended learning environment on aspects of motivation and performance
Margerete Imhof, University of Frankfurt, *Germany*
Regina Vollmeyer, University of Frankfurt, *Germany*

Web-based learning environments are considered to be effective in enhancing both student motivation and student learning. In a blended learning environment, we investigated how the initial motivation of the students and the changes of motivation over time were related to usage and performance in this class. The learning platform based on WebCT contained optional reading material, a mailing function, a discussion forum, self-tests, and a glossary. A sample of 220 students from a teacher training program in a required introductory psychology class was administered the QCM (a questionnaire measuring interest, challenge, subjective probability of success, and anxiety) at the beginning and at the end of the term. Frequency and content of the platform usage were recorded online for the different types of content. Performance was measured in terms of a multiple choice test covering the material of the entire semester. Results show that usage frequency of the web-platform predicts performance for all students. Further analyses suggest that three groups need to be differentiated in terms of motivational state. We found that all aspects of motivation change over time, however with a specific pattern in each group. The groups also differ in terms of content which they preferred to access. The difference in performance level, however, was not significant. The question how this can be explained will be discussed. The practical challenge is how a web-based learning environment can be tailored to the needs of learners with differential motivational orientations, and, in particular, how those students who display high anxiety can be supported to benefit from a web-based learning environment right from the start.

Goal orientations and help-seeking: intentions and actual use of helps in learning statistics on a web site
Nathalie Huet, University Toulouse 2, *France*
Christian Escribe, University Toulouse 2, *France*
Fabrice Noury, University Toulouse 2, *France*

As noticed by Aleven et al. (2003), help-seeking has been mostly studied in traditional school contexts but not in computer-learning environment. This paper aimed to examine the impact of goal orientation on the intention of the learner to consult computerized assistance and actual use of the assistance suggested on a web site of training of statistics. Forty-nine students in psychology had to solve statistics problems on a web site designed for their course. Before the validation of their answer they could use spontaneously instrumental help such as work-out problems, glossary or on-line course of statistics. In case of failure, they received automatically a feedback which suggests them to use instrumental help or executive help. Achievement goals were assessed by using the P.A.L.S (Migdley & al. 2000). The intention of the learner to use instrumental

assistance, executive assistance or intention to avoid assistance was evaluated by a questionnaire. Results showed for the intention to use assistance that: (1) Mastery goals were positively associated with instrumental assistance and influenced negatively executive assistance, (2) Performance approach goals and performance-avoidance goals influenced positively executive assistance, (3) Performance approach goals and performance-avoidance goal influence positively intention to avoid assistance. For the actual help, the results show that (1) Mastery goals were positively associated with instrumental assistance before feedback and influenced positively executive assistance, (2) Performance-avoidance goal influence negatively executive assistance. Finally, only a significant relationship was found between intention to use instrumental assistance and the actual use of instrumental assistance. But this relation was mainly due to mastery goal. Future research should investigate the effects of goal orientations on the differences existing between the intentions to use assistance and to use actual assistance in ILE.

A 12
28 August 2007 15:00 - 17:00
Room: 4.95
Symposium

Working memory and individual differences in arithmetic

Chair: **Joke Torbeyns,** K.U.Leuven, *Belgium*
Organiser: **Joke Torbeyns,** K.U.Leuven, *Belgium*
Organiser: **Bert De Smedt,** K.U.Leuven, *Belgium*
Discussant: **Maria Chiara Passolunghi,** University of Trieste, *Italy*

Number and arithmetic are essential components of our everyday life. Impairments in the development of children's numerical and arithmetic skills consequently put serious constraints on their functioning, not only in school but also in out-of-school contexts. Therefore, cognitive and educational psychologists have extensively studied the variables that might influence the development of these skills. In particular, working memory has been put forward as an important cognitive factor that contributes to children's development in number and arithmetic (LeFevre et al., 2005; Pickering & Phye, 2006). This symposium covers five empirical studies and one discussion paper that aim at deepening our understanding of the relation between children's working memory competencies and (the development of) their mathematical skills. The papers cover various aspects of children's working memory: the phonological loop and the visuo-spatial sketchpad (i.e. short-term memory storage), the central executive, speed of processing, and speed of counting. The papers also address different sub-domains of mathematics education, ranging from single-digit addition to multi-digit arithmetic and context problems. Furthermore, the relation between children's working memory capacities and mathematical skills is analysed in both normally achieving children and children with mathematical difficulties. The authors use diverse and sophisticated methods for gathering and analysing data, such as the ability-level match design, the dual-task paradigm, the choice/no-choice method, the integration of correlational and experimental research methodologies, and targeted interventions. Next to these theoretical and methodological contributions, all papers clearly discuss the educational significance of the results and offer guidelines for the optimisation of current practices in mathematics instruction.

Differential influences of working memory and basic fact knowledge on measures of arithmetic achievement in fourth-graders
Dietmar Grube, Georg-August-Universität Gottingen, *Germany*
Ulrike Weberschock, Georg-August-Universität Gottingen, *Germany*

Considerable evidence supports the idea that arithmetic performance is influenced by working memory and by basic arithmetical fact knowledge. This position is supported by many studies that show correlational relationships between arithmetic test achievement on the one hand and working memory measures and simple arithmetic (basic facts) scores on the other hand. However, does this position hold independent of how arithmetic performance is assessed, i.e. does it hold for every index of arithmetic performance in equal measure? In the present study the relationships between arithmetic performance and working memory / basic fact knowledge were explored taking four different task demands of arithmetic performance into consideration. Working memory capacity was assessed using memory span forward and backward representing phonological loop and central-executive functioning, respectively. Basic fact knowledge was quantified by measures of addition and subtraction with sums/numbers smaller than 20. Data were collected from 43 fourth-graders at the beginning of the school year. Correlations between the four arithmetical indices ranged from zero to moderate size. Further correlational analyses showed no influence of phonological working memory on arithmetic performance. Moreover, the intensity of influences of both central-executive working memory and basic fact knowledge depended on specific arithmetical task demands. It is concluded that specific arithmetic task demands do not reflect a unitary ability and are not influenced by the same factors in equal measure.

Strategy use, working memory and thinking aloud during the solution of multi-step arithmetic problems in children with or without math difficulties
Ernest C.D.M. van Lieshout, Vrije Universiteit Amsterdam, *Netherlands*

The main objectives of the present study were: (a) to study the influence of experimental variation in WM load by manipulating problem presentation duration on math performance, errors due to forgetting and strategy use, (b) to find evidence that math performance of children with poor math achievement perform poorly because of low WM resources and (c) to study the effect of thinking aloud on math performance. Forty-eight pupils were selected from grade 8 of Dutch elementary schools. Half of them formed the high math ability (HMA) group whereas the other half formed de low math ability (LMA) group. The mean age of the participants was 10.2 years. The pupils were presented with a measure for working memory and 40 addition and 40 subtraction problems (e.g. 45 – 28 =). The problems were either presented while the participant was reading the problem or until the child gave its answer. Further, the child was asked to solve the problem aloud or silently. The response times, accuracy scores, strategy frequencies and error types were subjected to (M)ANOVAs. Short problem presentation led to significant less correct answers and longer response times than a long presentation, especially during the loud verbalization condition. The overt verbalization could have disrupted the phonological loop, in which the problem information should be preserved. The LMA group appeared to suffer more from a shorter problem presentation than the HMA group in terms of accuracy, response times, execution of a WM taxing solution strategy and errors due to forgetting, which suggest that for the former group less memory resources were left for the calculation process. This conclusion was supported by a significant negative correlation between the degree of interference of short presentation duration and the size of the backward digit span.

The development of strategy use in elementary-school children: working memory and individual differences
Ineke Imbo, Ghent University, *Belgium*
Andre Vandierendonck, Ghent University, *Belgium*

The present study tested the development of working-memory involvement in children's arithmetic strategy selection and strategy efficiency. To this end, an experiment – in which the dual-task method and the choice/no-choice method were combined – was administered to 10-, 11-, and 12-year-old children. The dual-task method enabled us to obtain arithmetic performance data under two conditions: one without an additional working-memory load and one in which the executive component of working memory was loaded. The choice/no-choice method enabled us to obtain unbiased data on both strategy selection and strategy efficiency. We also obtained several individual-difference variables from each child, such as short-term memory span, processing speed, arithmetic skill, gender, and math anxiety. The results showed that working memory was needed in order to execute all strategies (retrieval, transformation, and counting) efficiently. Working memory was not needed in strategy selection though. Importantly, the ratio between available working-memory resources, on the one hand, and arithmetic task demands, on the other hand, changed across age. More frequent retrieval use, more efficient memory retrieval, and more efficient counting processes reduced the working-memory requirements. However, the decrease in working-memory involvement was not related to age-related increases in the efficiency of transformation processes or to age-related increases in the efficiency of general processes (e.g., encoding stimuli and pronouncing answers). Strategy efficiency and strategy selection were also modified by individual differences such as processing speed, arithmetic skill, gender, and math anxiety. Short-term memory capacity, on the other hand, was not related to children's strategy selection or strategy efficiency. It is concluded that working memory plays a significant role in children's arithmetic performance. However, as children grow older, fewer working-memory resources are needed. Finally, the importance of individual differences in arithmetic problem solving provides interesting ideas for future research.

Working memory and mathematical disabilities: evidence from Velo-Cardio-Facial syndrome?
Bert De Smedt, K.U.Leuven, *Belgium*
Ann Swillen, K.U.Leuven, *Belgium*
Lieven Verschaffel, K.U.Leuven, *Belgium*
Pol Ghesquiere, K.U.Leuven, *Belgium*

It has been hypothesized that mathematical disabilities (MD) are due to impairments in working memory. In the present study, we examined this association between working memory and math impairment in children with a genetic disorder known to be at risk for the development of MD, namely children with Velo-Cardio-Facial Syndrome (VCFS). More specifically, we investigated whether the MD of these children are due to deficits in working memory. Performance of twenty-five children with VCFS (age range: 6 – 12 years) was compared with a carefully selected individually matched control group. All children completed assessments of various mathematical abilities (single-digit arithmetic, multidigit arithmetic and word problem solving) as well as measures of working memory. Children with VCFS performed significantly slower on single-digit addition and subtraction and were significantly less accurately in solving multidigit calculations and word problems. They did not differ from controls on the highly retrieval based multiplication task, which suggests that fact retrieval is preserved in children with VCFS. Thus, the difficulties of children with VCFS in mathematics appear to be mainly of a procedural nature. Turning to working memory, children with VCFS performed significantly higher on the phonological loop

tasks. They scored lower than controls on the visuospatial sketchpad measures and listening span, but these differences disappeared when group differences in IQ were taken into account. Children with VCFS did not differ from controls on the central executive measures digit span backward and counting span. In sum, working memory could not give a satisfactory account of the math difficulties seen in children with VCFS. These data leave open the possibility that MD in VCFS might be due to a domain-specific deficit, for example in the representation of magnitudes. Such a hypothesis remains speculative and thus an interesting candidate for future research.

Bridging the gap between working memory research and teaching approaches in mathematics education

Sarah Hopkins, University of Western Australia, *Australia*
Celeste de Villiers, St Stephen's School Carramar, *Australia*

State-wide assessments continue to uncover a significant number of students who are not achieving appropriate levels of numeracy before entering secondary education. We argue that a critical but overlooked contributor to numeracy achievement is the ability to retrieve simple addition facts. Research has identified a subset of low-achieving students in mathematics who will not develop a reliance on retrieval for simple addition problems but will continue to use a counting-on strategy despite many years of practice. Reform practices in mathematics education do not address this problem with retrieval experienced by some students. In this study an intervention for promoting a reliance on retrieval for simple addition was pilot-tested. Ten students participated in a five week program designed to increase counting speed during simple addition performance. The effectiveness of the intervention in producing an increased reliance on retrieval was assessed using a multiple baseline across participants design. Preliminary results indicate that the intervention improves counting speed and is likely to improve the probability of retrieval. The pilot-test is part of a larger study to identify the prevalence of retrieval problems among students who do not achieve appropriate levels of numeracy before entering secondary education and to investigate whether numeracy outcomes improve for initially low achieving students if retrieval problems are addressed.

A 13
28 August 2007 15:00 - 17:00
Room: 0.81 Ortvay
Symposium

Researching teachers' competences in multi-ethnic classrooms: perspectives, methodology and implicat

Chair: **Dolly van Eerde,** Freudenthal Institute, Utrecht University, *Netherlands*
Organiser: **Dolly van Eerde,** Freudenthal Institute, Utrecht University, *Netherlands*
Discussant: **Ed Elbers,** Utrecht University, *Netherlands*

Researching teachers' competences in multi-ethnic classrooms: perspectives, methodology and implications. The classrooms of our schools are changing. In many countries all over the world there is an increasing diversity of students in classes, often due to migration. Teachers of multi-ethnic classes have to deal with the social, cultural and linguistic heterogeneity of their students. They are challenged to develop a sensible pedagogy for teaching and learning in order to

understand and interact with all the students in their class. The symposium brings together the findings of four multi methods studies from different points of view allowing a discussion about teacher competences in multi-ethnic classrooms. In the first paper Hirst and Brown conceptualise diversity as socially constructed and competences as being constrained and enabled by institutional and social practices. The data of two cases studies show how middle school teachers' knowledge of diversity influenced their pedagogical practices. The second paper by Cesar and Borges is a meta-analysis of the results of two research projects aimed at promoting more inclusive learning settings in multicultural classes. By analysing teachers practices and accounts, competencies for intercultural education come into sight. The third paper by Den Brok and colleagues addresses the identification of teachers'communicative competencies in multicultural classes. A series of case studies in primary, secondary and higher education provided an empirical foundation for the formulation and specification of teacher competencies in multicultural settings. In the fourth paper Hajer explores teachers' competences from a view that integrates language and content learning, by analysing teachers' activities and ideas about language proficiency, language learning and their own role. Her data show a close connection between pedagogical relations and the development of content-integrated approaches and a pattern in the development of teachers' commitment, both in thinking and acting in their classrooms.

Making the teacher 'competent': Teacher competences and classroom diversity
Elizabeth Hirst, Griffith University, *Australia*
Raymond Brown, Griffith University, *Australia*

Classrooms around the world are becoming increasingly diverse as a result of increasing patterns of trans-national mobility and migration. Diversity is often theorised in terms of the differences and background characteristics that students bring with them into educational settings. These characteristics are generally considered to be pre-given stable traits and specific cultural capabilities. In order to be effective, teachers are expected to develop a variety of competences in order to understand their students and consider these differences in planning lessons and making content available to all. The goal is to fit classroom pedagogy to the needs of different students. This paper addresses two key issues implied in this approach. Firstly, the teacher is often constructed as conduit of pedagogy, and diversity in terms of teachers is largely neglected other than the differences in experience, for example between pre-service, beginning and experienced teachers. When diversity is theorised as emergent and socially constructed in the context of institutional, social and linguistic practices, rather than being a stable background variable, 'difference' between teachers and between students is seen as contingent on the social and institutional practices of schooling. Secondly, and building on this understanding of diversity, how teachers are 'made different' by institutional and social practices has an impact on the teachers' performance of specific classroom competences. Competences are considered as being constrained and enabled by these practices. This issue of teacher difference and teacher competences are examined in the light of data gathered in two projects, a nine month ethnographic study of a middle school second language classroom taught by an Indonesian teacher, and a more recent project where data was generated through interviews with middle school teachers about their understandings of diversity and how this knowledge impacted on their pedagogical practices.

Teachers' competences in multicultural classes: a meta-analysis based in two research projects
Margarida Cesar, University of Lisbon, *Portugal*
Ines Borges, University of Lisbon, *Portugal*

In the last decades migration movements grew higher and many schools became multicultural and multiethnic. These students represent a challenge for the teachers and the educational systems, particularly in Portugal that almost had no immigration. Many students first language is not Portuguese, and their culture has values, ways of acting, reasoning, learning, expectations and interests that are quite far away from the mainstream culture. In this new society reflecting upon which teachers' competencies facilitate the access to an intercultural education became an essential step. A meta-analysis based in the results of two research projects was done: Interaction and Knowledge (IK) and IDMAMIM (Innovazione Didattica MAtematica e sussidi tecnologici in contesti Multiculturali, con alunni Immigrati e Minoranze). Both projects aimed at promoting more inclusive learning settings in multicultural classes. The question behind this meta-analysis is: What competencies do teachers need in order to promote an intercultural education? The participants that served as a basis for this meat-analysis were the teachers, teacher/researchers, researchers, students and significant others involved in these projects. The data collecting instruments were participant observation (audio and video/taped; several observers), questionnaires, interviews and documents. The interpretations were produced and discussed between several participants. The results illuminate that teachers' pre-and in-service education did not prepare them to teach multicultural classes. But some teachers looked for collaborative ways of overcoming their difficulties, namely by participating in research projects in which they can elaborate and discuss intercultural tasks, reflecting upon their practices. In order to promote an intercultural education it is not enough to be sensitive to multiculturality. It is also needed to develop competencies like following diverse ways of reasoning, arguing and approaching a task. Being multilingual also helps, as well as knowing other cultures well. Several examples illuminate how these competencies can be seen while analysing teachers practices and accounts.

Classroom interaction studies as a source for teacher competences in multi-ethnic classrooms
Perry den Brok, IVLOS Institute of Education, Utrecht University, *Netherlands*
Maaike Hajer, Utrecht University of Professional Education, *Netherlands*
Dolly van Eerde, Freudenthal Institute, Utrecht University, *Netherlands*

Dealing with ethnic and linguistic diversity is one of the major challenges in today's education. Therefore, the formulation of competencies for teachers and teacher training should take into account the specific requirements of teaching in multicultural schools. In this contribution, a series of case studies will be described that were conducted to identify and formulate teachers' communicative competencies in multicultural classes, using a mixture of instruments and data sources and to provide recommendations for teacher education based on these findings. Different elements of teachers' communicative competence were disclosed through qualitative and quantitative data. First, the literature on teacher competences and standards in multicultural classes was studied. Second, a series of case studies from primary to higher education explored teachers' knowledge, beliefs and behaviours in creating healthy teacher-student relationships as well as making lesson content accessible for all students. These case studies consisted of observation and video-registration in combination with data from (stimulated recall-) interviews and concept mapping tasks. Some also included small interventions or teacher and student questionnaires. The findings show how case studies with quantitative and qualitative data collection can help to provide an empirical foundation for the formulation andspecification of teacher competencies in multicultural settings. Based on our findings, frameworks of teacher competences for multicultural

classes can be refined and tested across settings with such combined setups. The generated knowledge can form a major starting point for the professional development and training of teachers in multicultural schools.

Developing teachers' competences in integrated content and language instruction
Maaike Hajer, Utrecht University of Professional Education, *Netherlands*

Content teachers in classrooms with a high amount of second language learners experience challenges in providing high quality content teaching. Different models have been developed that integrate language and content learning, but implementation in classroom interaction has shown to be difficult. This paper reports on a series of case studies, exploring content teachers' behaviour and thinking, using observational data as well as concept-mapping tasks and stimulated-recall interviews. Data were gathered in upper primary, secondary and vocational training in different content areas. Some studies included professional development of the teachers. Data analysis contained description of instructional strategies, using an adapted version of the Sheltered Instruction Observation Protocol (Ecchevaria a.o. 2004). Speech fragments considered typical of the interaction were analysed in detail describing the way in which comprehensible input was provided, language production was promoted and/or feedback given. As a second step the interview data were connected to the observations. Teachers' ideas about language proficiency, language learning and their own role were described. Findings show a close connection between pedagogical relations and development of content-integrated approaches. Another finding was a pattern in the development of teachers' commitment, both in thinking and acting in their classrooms, which we describe in terms of four hypothetical steps that could be used in the design of professional development programs. Echevarria, J., Vogt, M. E., & Short, D. (2000) Making content comprehensible for English language learners: the SIOP model Boston, Allyn & Bacon.

A 14
28 August 2007 15:00 - 17:00
Room: 0.100A
Symposium

Optimizing peer assessment for learning

Chair: **Jan-Willem Strijbos,** Leiden University, *Netherlands*
Chair: **Dominique Sluijsmans,** Open University of the Netherlands, *Netherlands*
Organiser: **Jan-Willem Strijbos,** Leiden University, *Netherlands*
Organiser: **Dominique Sluijsmans,** Open University of the Netherlands, *Netherlands*
Discussant: **Keith Topping,** University of Dundee, *United Kingdom*

Peer assessment is an arrangement where equal status students judge a peers' performance with a rating scheme or qualitative report (Topping, 1998) and it is a hot issue in education (Sluijsmans, Brand-Gruwel, Van Merriínboer, & Martens, 2004). In peer assessment, students are considered as active persons who share responsibility, reflect, collaborate, and conduct continuous dialogue with their peers (Boud, 1990; Orsmond, Merry, & Callaghan, 2004). Most studies on peer assessment focused on inter-rater reliability to qualify the accuracy of peer assessment as compared to teacher assessment (Falchikov & Goldfinch, 2000). Although many researchers advocate that peer assessment has a positive effect on learning, empirical evidence for learning effects is very scarce

(13 studies since 1990: Van Gennip, Segers, & Tillema, 2005). Moreover, peer assessment is rarely studied in (quasi-) experimental settings. Reviews of peer assessment studies reveal a high level of diversity and ambiguity in actual peer assessment practice. This makes it difficult to understand how peer assessment contributes to a better performance (Sluijsmans, Dochy, & Moerkerke, 1999). Among factors that can affect the success or failure of peer assessment, but have not yet been investigated in (quasi-) experimental settings, are for example the structure of a peer assessment format and the composition of dyads. The contributions in this symposium will address the relationship between peer assessment and learning benefits. Specifically, attention will be paid to the role of the feedback – either a rating or report that informs the student about his or her performance. Key to the hypothesised learning benefits is whether a receiver accepts the feedback and subsequently improves performance. The contributions also cover various levels of education (secondary, vocational and higher education) which illustrates that peer assessment is at the core of educational innovation.

The role of psychological safety, value diversity, clarity, dependence and trust in a peer assessment setting

Nanine van Gennip, Leiden University, *Netherlands*
Mien Segers, Leiden University, *Netherlands*
Harm Tillema, Leiden University, *Netherlands*

In recent years, peer assessment is increasingly being used in educational as well as organizational settings. The most important reasons for implementing new forms of assessment are to motivate students and stimulate them to assume responsibility for their own learning processes. In this way, it is expected that students will learn more. The goal of this contribution is to examine the perceived effectiveness of peer assessment in vocational education, and to get insight into the role of five process variables that are likely to affect this effectiveness: (1) psychological safety; (2) value diversity; (3) clarity of the assessment process; (4) dependence on other and self; and (5) trust in other and self. These variables are selected based upon prior research in different fields (e.g., Van den Bossche, Van Gennip, Gijselaers, Segers, & Kirschner, 2006). Sixty-one students in vocational education in The Netherlands participated in a course in technical skills. The students were required to design and construct a robot-dog: 36 of them were traditionally assessed by their teacher (the control group) and the other 25 used peer assessment as assessment method (the experimental group). Our results indicate that students in the experimental group: (1) felt more safe; (2) perceived the assessment process and criteria as more clear, and (3) reported to depend more on their peers while finishing their product, as compared to students in the control group. In addition, psychological safety and clarity predicted the degree of trust and value diversity. In other words, when students felt safer, and regarded the assessment as more clear, trust was higher and value diversity lower, and therefore students perceived that they had learnt more.

Peer assessment during group work in teacher training: Impact of peer assessment format structure and expertise on student learning

Dominique Sluijsmans, Open University of the Netherlands, *Netherlands*
Jan-Willem Strijbos, Leiden University, *Netherlands*

Collaborative learning in small groups is now widely used in a various learning contexts. Group tasks facilitate peer learning and the development of collaboration skills. Since assessment strongly influences learning any course objective, peer learning and/or collaboration must have an assessment that promotes it (Biggs, 1996; Frederiksen, 1984). In this respect, peer assessment - an arrangement for students to consider the level, value and quality of a product or a performance of

other equal status students (Topping, 1998) - can be a valuable tool to align the assessment with the group task. Karau and Williams (1993) showed in their meta-analysis that peer assessment of individual contributions to group tasks had a strong influence in ensuring that each group member did a fair share of the work. Peer assessment is increasingly applied in higher education to enhance the quality of group learning, discourage free-riding and reward individual input (Falchikov & Goldfinch, 2000; Sluijsmans, Dochy, & Moerkerke, 1999; Topping, 1998). While there is a fair amount of studies on peer assessment in groups, there is little consistency in the peer assessment formats. This study investigates two variables that may account for the success or failure of peer assessment of group tasks in collaborative learning in a controlled experimental setting: (a) the structure of a peer assessment format (high/low) that is used to assess the contribution of peers to group tasks; and (b) the domain expertise of students (high/low) while working on an ill-structured group task. Specifically, this study investigates how both variables affect the quality of collaborative learning performance, students' perceived group efficiency, and the reliability of peer assessments in the context of teacher education.

Effects of formative peer-assessment on writing performance: What is the most beneficial role of the assessee?
Sarah Gielen, University of Leuven, *Belgium*
Filip Dochy, University of Leuven, *Belgium*
Liesje Tops, University of Leuven, *Belgium*
Elien Peeters, University of Leuven, *Belgium*

In this study on the effects of formative peer-assessment on writing performance of students in the first year of secondary education, the effect of three different roles of the assessee is examined. All three conditions require a revision of the essay after feedback by the assessee, but in the first condition the assessee indicates needs in a request for feedback, in the second the assessee explains the consequences of the feedback for his work to the teacher, and in the third condition the assessee has no extra requirements. We can conclude that our manipulation of the role of the assessee had no impact on learning, nor on direct revision behaviour. We could not find a difference in progress on the short term, nor in performance on the long term. Although there was a difference in revision behaviour, this seemed to be mediated by the type of criteria that were discussed in the feedback.

The impact of feedback content and writing ability-level of the sender on the perception of peer feedback and learning
Jan-Willem Strijbos, Leiden University, *Netherlands*
Susanne Narciss, Technical University Dresden, *Germany*

The shift towards student-centered learning arrangements places a high emphasis on students to assume responsibility for their learning. Peer assessment is well-suited to increase students' responsibility: i.e. equal status students judge a peers' performance with a rating scheme or a qualitative report (Topping, 1998). Many peer assessment researchers stress that the feedback about a performance is essential (Sluijsmans, Brand-Gruwel, & Van Merriínboer, 2002), but the evidence for learning effects is scarce (Van Gennip, Segers, & Tillema, 2005). Recent research on 'informative' tutoring feedback reveals that 'hints and revision proposals' as part the feedback (e.g., give an example), rather than 'evaluative' feedback (e.g., 3 out of 5 are correct), fosters persistence and improves student performance (Narciss, 2004). Students' also often express concerns about the fairness and usefulness of peer assessment, which may be related to sender characteristics (Leung, Su, & Morris, 2001). In this study we will investigate the effect of

feedback content (evaluative/informative) and writing ability-level of the sender (high ability/low ability) in an experimental set-up (a 2×2 factorial between-subjects pre-test treatment post-test control group design). Subjects in four experimental conditions were given a scenario, in which a fictional student received feedback by a peer, asked to indicate whether they perceived this peer feedback as fair, useful, accept it, would be willing to improve, and express their affect. The preliminary results reveal that the informative feedback is perceived as significantly more useful and accepted. Feedback by a high ability peer is significantly more accepted than feedback by a low ability peer. Finally, a significant interaction revealed that informative feedback by a high ability peer leads to more negative feelings compared to evaluative feedback, and the opposite was observed for a low ability peer.

Do students' use feedback to make sense of their learning during the assignment process?
Paul Orsmond, Staffordshire University, *United Kingdom*
Stephen Merry, Staffordshire University, *United Kingdom*

The success of constructive alignment may be dependent on how students respond to tutor feedback. This contribution draws from three studies by the authors on the impact of tutor feedback and aims to formulate guidelines for the design and implementation of feedback opportunities through peer-assessment. The first study (Orsmond, Merry, & Reiling, 2005) investigated biology students' utilisation of written tutor feedback on summative coursework. The results showed that: (A) feedback that emphasises the purpose of students' tasks and relates these to course objectives was found helpful, (B) students did not always see feedback as having multiple dimensions, and (C) heightened awareness by tutors of how students use feedback may influence how tutors write feedback. The second study (Orsmond, Merry, & Sheffield, in press) investigated how students and their project supervisors use formal module learning outcomes in undertaking an assessed assignment. This study showed that (A) students use a mix of both the formal learning outcomes and their own alternative assignment outcomes, and fail to distinguish between them, (B) students may see the end point of assignments as the production of the product (poster/essay) and not learning outcomes, and (C) there is much discussion between the students in the absence of tutors which appears to be used in the construction of learning. The final study (Merry & Orsmond, in prep.) reports on semi-structures interviews of 6 tutors and 18 students regarding a piece of documented feedback. The outcomes showed that: (A) student's interpretation of tutor feedback is highly individual; (B) that this individual interpretation may lead students to implement feedback differently to how the tutor intended, and (C) tutor feedback rarely addressed higher cognitive issues. The outcomes of these three studies, in terms of guidelines for tutors in both the design and implementation of feedback through peer-assessment, will be discussed.

A 15
28 August 2007 15:00 - 17:00
Room: 1.71 Pócza
Symposium

Supporting self-regulated learning

Chair: **Franziska Perels,** Technical University of Darmstadt, *Germany*
Chair: **Barbara Otto,** Technical University of Darmstadt, *Germany*
Organiser: **Franziska Perels,** Technical University of Darmstadt, *Germany*
Organiser: **Barbara Otto,** Technical University of Darmstadt, *Germany*
Organiser: **Bernhard Schmitz,** Technical University of Darmstadt, *Germany*
Discussant: **Michaela Schmidt,** Technical University of Darmstadt, *Germany*

Self-regulation is a competence humans need to meet the requirements of life-long learning. Therefore, it is important to analyse the possibilities to support self-regulated learning. In this symposium (chair: F. Perels, B. Otto and B. Schmitz, University of Technology Darmstadt, Germany), we present four different approaches that examine important aspects of self-regulated learning in school and university. C. Dignath et al., University of Frankfurt, Germany: The efficacy of self-regulated learning interventions at primary and secondary school level – a meta-analysis D. Whitebread & P. Coltman, University of Cambridge, UK: Towards a pedagogy for teaching thinking and developing metacognitive abilities in young children F. Perels et al., University of Technology Darmstadt, Germany: Improving self-regulated learning of preschool children. Evaluation of a training for kindergarten teachers P. Gradinger et al., University of Vienna/ University of Applied Sciences Linz, Austria: Improving self-regulated learning: Differential effects by VEL based on quantitative and qualitative data Beginning with a meta-analysis investigating the efficacy of self-regulated learning interventions at primary and secondary school level the second paper reports findings from two studies focusing on different approaches to teaching 'thinking' and the development of self-regulatory and metacognitive abilities in young children. The third reported study also refers to self-regulated learning of young children by presenting the findings of a training programme for kindergarten teachers to support self-regulated learning of pre-school children. We close the symposium with another intervention study, which describes differential effects of a computer-based intervention within university context. The presented studies will be discussed regarding their theoretical and educational significance (M. Schmidt, University of Technology Darmstadt, Germany).

The efficacy of self-regulated learning interventions at primary and secondary school level – a meta-analysis
Charlotte Dignath, University Johann Wolfgang Goethe, *Germany*
Gerhard Büttner, University Johann Wolfgang Goethe, *Germany*
Hans-Peter Langfeldt, University Johann Wolfgang Goethe, *Germany*

Recently, research has increasingly focused on fostering self-regulated learning amongst young children. To consider this trend, this article presents the results of a differentiated meta-analysis of 77 studies on enhancing self-regulated learning amongst primary and secondary school students. Based on recent models of self-regulated learning, which consider motivational as well as cognitive and metacognitive aspects (see Boekaerts, 1999), effects of self-regulated learning on academic achievement, cognitive and metacognitive competencies, as well as on motivation were analyzed. To get a differentiated picture of the training effects on these diverse components of

self-regulated learning, separated meta-analyses were conducted for every single outcome category. As the results show, self-regulated learning training proved to be effective already at primary school level. Subsequent analysis tested for the effects of several moderator variables, which consisted of study features and training characteristics. Most of the moderator analyses revealed inconsistent results amongst the various outcome categories. Therefore, the effectiveness of a certain training feature seems to depend on the school subject and the learning contents (e.g., mathematics or reading). The analysis yielded effects in favour of interventions conducted in the classroom instead of carried out by the researchers themselves. Age-related distinctions showed that younger and older students benefit most from interventions in a different way. Students achieved higher effects when training programmes included the instruction of metacognitive strategies. Concerning the instruction of motivational strategies, this result could be found only for the mathematics area. Moreover, the synthesis detected a general problem of very heterogeneous definitions of metacognition and self-regulation. Further research on fostering self-regulation competence amongst students should increasingly take into account the combination of metacognitive and motivational strategies instruction. This demand is closely linked to the need of a more consistent meaning of the terms metacognition and self-regulation.

Towards a pedagogy for teaching thinking and developing metacognitive abilities in young children

David Whitebread, University of Cambridge, *United Kingdom*
Penny Coltman, University of Cambridge, *United Kingdom*

This paper reports findings from two studies focusing on different approaches to teaching 'thinking' and the development of self-regulatory and metacognitive abilities in young children. There is a considerable literature supporting the crucial significance of metacognitive abilities for the development of effective thinking and learning. Other research has made claims about the efficacy of 'teaching thinking' programs and approaches in stimulating metacognitive development. In much of the literature there is agreement that metacognitive abilities begin to develop around the age of 8 years. With some notable exceptions, therefore, much of the work examining the relation between pedagogy and metacognition has focused on older Primary and Secondary aged school children. However, more recent work, by ourselves and others, has shown that the self-regulatory and metacognitive abilities of younger children (i.e. from 3-7 years) have been systematically underestimated by self-report and experimental methodologies. Observational approaches in naturalistic settings have revealed much earlier origins of the abilities to monitor and regulate cognitive activity. The studies reviewed in this paper have explored the extent to which : · young children are capable of developing metacognitive abilities and reporting upon their own thinking · pedagogical programmes can be developed which facilitate self-regulatory and metacognitive abilities in young children · we can identify the key elements in such practices which appear to be related to the development of young children's self-regulatory and metacognitive abilities The findings from these studies have provided evidence that 3-7 year old children are developing their metacognitive abilities, knowledge and motivations, particularly in relation to the ongoing monitoring and regulation of cognition. A range of pedagogical practices are effective in provoking and supporting this metacognitive activity, particularly where they provide children with opportunities for self-initiated activity, with cognitive challenge and with the opportunity to articulate their thinking and reflect upon it.

Improving self-regulated learning of preschool children - Evaluation of a training for kindergarten teachers

Franziska Perels, Technical University of Darmstadt, *Germany*
Barbara Otto, Technical University of Darmstadt, *Germany*

Self-regulation is a competence humans need to meet the requirements of life-long learning, which could be supported already for preschool children. Therefore, the aim of the presented study was to test the effects of a self-regulation training for kindergarten teachers on both their own self-regulation as well as the improvement of self-regulation in the preschool children they were teaching. The training for the kindergarten teachers was based on the process model of self-regulation by Schmitz and Wiese (2006) and also included methods to foster self-regulation in preschool children. 35 kindergarten teachers (19 in the experimental group and 16 in the control group) and 97 children (48 in the experimental group and 49 in the control group) of German kindergartens took part in this study. For the training evaluation, a control group design was applied using a self-regulation questionnaire for the kindergarten teachers and an interview for the preschoolers. The results obtained by means of analyses of variance show that on the level of the kindergarten teachers their self-regulation as well as the use of methods to support self-regulation in preschool children improved significantly (self-regulation, $p<.05$; methods, $p<.10$). The self-regulation of the preschoolers whose kindergarten teachers took part in the training improved significantly as well ($p<.00$). Therefore, the conclusion may be drawn that self-regulated learning of preschool children can be supported if their kindergarten teachers increase their own self-regulation knowledge and competence. The results of this study have important implications for the curriculum of kindergarten instruction, which is in change in Germany.

Improving self-regulated learning: Differential effects by VEL based on quantitative and qualitative data

Petra Gradinger, University of Vienna, *Austria*
Barbara Schober, University of Vienna, *Austria*
Ralph Reimann, University of Vienna, *Austria*
Dominik Lapka, University of Vienna, *Austria*
Christiane Spiel, University of Vienna, *Austria*
Petra Wagner, University of Applied Sciences Linz, *Austria*

Schools and universities should promote educational motivation and competences for life long learning of their students (see Commission of the European Communities, 2000; Spiel & Schober, 2002), in short self-regulated learning. But still, empirical results show sometimes an insufficient learning culture in the central institutions of education. E-learning is one promising possibility to establish a new learning and teaching culture. Moreover e-learning gives a set of other advantages, for example easy accessibility of disadvantaged people. We will present here the Vienna E-Lecturing (VEL)-program, which was developed, implemented and evaluated by a research team. VEL is a long term intervention of one year duration and is totally integrated in a compulsory lecture at the university VEL is designed as a blended learning concept for big courses at university. It follows up four goals: imparting (1) professional content (research methods and evaluation), (2) cooperative learning, (3) self-regulated learning and (4) e-competences. The theoretical background of VEL is provided by the process model of self-regulated learning (Schmitz, 2001). To implement a blended learning concept, the VEL program consists of a systematic combination of virtual learning modules and face-to-face sessions. The main goals of the paper are (1) to present the intervention VEL, (2) to demonstrate the (differential) effectiveness

of VEL and (3) to give additional explanation of quantitative results through qualitative data. Data were collected before, during and after the intervention. Instruments comprised knowledge tests, questionnaires, and the observation of learning behaviour. Up to now 150 students participated in VEL and 150 students served as controls. The summative evaluation shows positive effects of VEL regarding all four goals. Differential effects are hardly to find, but do exist. Qualitative Data can support results through clearing up the learning background. Overall, the application of VEL is recommendable for all regular students at university.

A 16
28 August 2007 15:00 - 17:00
Room: 7.59
Symposium

Complex systems and education: Conceptual principles, methodologies, and implications for education

Chair: **Michael Jacobson,** Nanyang Technological University, Singapore, *Singapore*
Organiser: **Michael Jacobson,** Nanyang Technological University, *Singapore*
Discussant: **Micki Chi,** University of Pittsburgh, *USA*

The primary goal of this symposium is to build upon arguments made in a recent Special Issue of the Journal of the Sciences that research in the physical and social sciences related to the study of complex systems has theoretical, curricular, and methodological implications for educational research and practice. The papers to be presented in this symposium represent current research related to these themes. The first paper provides an overview of the field of complex systems, critically summarizes the literature related to complex systems in education, discusses expert-novice research into ontological dimensions of problem solving involving complex systems phenomena, and argues for the implications of complex systems conceptual perspectives and methods to address important educational and research issues. The second paper discusses a program of research into challenges experienced by students who are learning about complex systems, in particular the difficulty of being able to conceptually shift representations from a micro-level comprised of individual agents to a macro-level of the overall system's behavior that may have emergent properties that differ from those of the agents. The third paper considers ways in which multi-agent computer models may be used in a university level Materials Sciences course to help students learn a core set of unifying principles that they in turn could use to understand the causal structures underlying behaviors in a range of apparently disparate phenomena within a domain. The final paper illustrates the methodological implications of complex systems computational modeling through an analysis of collaborative online problem solving discussions by student dyads in which convergence in the group discussions is viewed as an emergent behavior arising from the transactional interactions between group members. After discussant comments, there will be a discussion with the audience about the themes and research findings of the symposium papers.

Complex systems in education: A universal acid?
Michael Jacobson, Nanyang Technological University, *Singapore*

It has been argued that nearly all phenomena in the natural and social sciences may be characterized as complex systems, that is, systems in which at a micro-level there are elements or agents that interact with each other and the environment based on often simple rules and that organize based on these interactions, often with higher order and qualitatively different properties emerging at a macro-level of the system. The multi-disciplinary study of complex systems over the past quarter of a century has led to the articulation of important new conceptual perspectives and methodologies that are of value both to researchers in these fields as well as to professionals, policy makers, and citizens who must deal with challenging social and global problems in the 21st century. Given the increasing importance of knowledge emerging from the study of complex systems, there are perhaps three core issues from an educational perspective that must be answered. First, are there distinctive conceptual perspectives and "ways of thinking" about complex systems that experts in this area have compared to novices? There is preliminary research that suggests this is in fact the case. A second core issue concerns the "learnability" of these ideas for students at the pre-college and even college levels. As will be reviewed in the conference paper, a growing body of research is documenting that students at the pre-graduate school level can in fact learn core knowledge that is being articulated by scientists who study complex physical and social systems. The third issue concerns the potential of infusing core concepts derived from the study of complex systems—such as self-organization, feedback, and emergent properties that have been found to be relevant in both the physical and social sciences—into the K-16 curriculum. The conference paper will elaborate on each of these three issues.

Actions Across Levels (AAL): A multiple levels perspective on what it means to make sense of complex systems

Sharona Levy, University of Haifa, *Israel*
Uri Wilensky, Northwestern University, *Singapore*

Furthering our understanding of what it means to make sense of complex systems is becoming a pressing imperative, as educational systems begin incorporating such constructs into standard curricula. We propose a framework, Actions Across Levels (AAL), for understanding and investigating how people reason about complex systems. This framework consists of two dimensions: description levels and mental actions undertaken while interpreting systems. The notion of levels is a central component in agent-based approaches, specifying both individual agents and the overall system's emergent behavior. Thus, one dimension in the AAL framework is the description level: agent, aggregate or a méêlange of the two. The second dimension introduces three mental actions, involved in reasoning about systems. Rule-making: connecting conditions and actions, which govern agents' behaviors as they respond to their environment or internal states; relating global changes and affected properties; or combinations of the two; Paralleling: operating multiple interacting agents concurrently; Chaining: observing or deriving a sequence of states, temporal changes in the system and/or its elements. In previous work, we investigated sixth-grade students' reasoning about ordinary complex systems, discovering a pervasive strategy: "mid-level construction". We have found that students invent intermediate groups in one of two trajectories: starting from the agents and grouping; or starting from the aggregate and partitioning. We have also found that students who formed groups by grouping agents entertained a greater range of complexity ideas. In this study, we further explicate this strategy by coding the above interviews using the AAL framework. We have located group strengths regarding the different components, and found associations between an individual student's strengths and the specific forms of "mid-level" s/he creates. We discuss these findings with respect to support for the AAL framework and reported difficulties in learning and teaching complex systems.

An empirical study of a complex systems approach to undergraduate engineering curricula through the construction of agent-based models
Paulo Blikstein, Northwestern University, *USA*
Uri Wilensky, Northwestern University, *USA*

This paper reports on a three-year empirical study of MaterialSim, an agent-based set of microworlds built by the authors in the NetLogo environment. This design-based research builds on previous studies that have suggested the benefits of multi-agent modeling for understanding how a variety of complex behaviors in science derive from simple, local rules. Three user studies were conducted with a total of 21 Material Science undergraduate students enrolled in an introductory Materials Science course. Students were observed and videotape while designing and running multi-dimensional experiments with pre-built models, as well as designing a model on their own. We present evidence in the form of classroom observations, pre/post surveys, video data, and excerpts from students' work, which suggest the usefulness of the complex systems perspective infused into MaterialSim design. The experience enabled students to understand unifying principles in a particular scientific field and build sophisticated models based on those. In a short period of time, students were able to correctly identify most of the underlying principles in the simulation model, connect them to the actual phenomenon, and even infer content that went beyond what is taught in introductory Materials Science courses. We are currently extending the MaterialSim design, and preparing for its implementation as part of the regular undergraduate Materials Science curriculum.

A 17
28 August 2007 15:00 - 17:00
Room: 0.65
Symposium

Antecedents of emotions in education

Chair: **Thomas Götz,** University of Munich, *Germany*
Chair: **Anne Frenzel,** University of Munich, *Germany*
Organiser: **Anne Frenzel,** University of Munich, *Germany*
Organiser: **Thomas Götz,** University of Munich, *Germany*
Discussant: **Lisa Linnenbrink ,** Duke University, *USA*

Until recently, emotional experiences related to learning and achievement have been neglected in educational research. In the past ten years, however, there has been a discernable increase in theoretical and empirical contributions on emotions in education. This increased interest is reflected in three recent special issues (Efklides & Volet, 2005; Linnenbrink, in press; Schutz & Lanehart, 2002) and an edited volume (Schutz & Pekrun, in press) on this topic. However, despite this increase in studies on emotions in education, little is known about their antecedents. Knowledge concerning the antecedents of emotional experiences is not only of particular relevance for understanding students' emotions but also important for designing emotionally sound educational environments. The symposium aims to contribute to filling this research gap. (1) Frenzel and colleagues focus on cultural antecedents of academic emotions. They present a study which cross-culturally validates the Academic Emotions Questionnaire-Mathematics and analyzes whether German and Chinese students differ in their experiences of academic emotions.

(2) The focus of Preckel and colleagues' study is on aspects of the reference group, namely its achievement level, which might be an important antecedent of students' emotional experiences in class, additionally to individual achievement. (3) Götz and colleagues investigate whether intelligence has an impact on academic emotional experiences and (4) Dina and Efklides analyze the effects of goal orientation instructions and extrinsic feedback valence on students' emotions. Finally, (5) Järvenoja and Järvelä focus on the regulation of emotions in social learning situations. The competency to regulate one's emotional experiences can be assumed to impact on the actual experiences of academic emotions and can consequently be seen as central antecedent of emotions. Results of the five studies will be summed up and discussed by a well known expert in research on academic emotions, namely by Lisa Linnenbrink from Duke University, US.

Achievement emotions in Germany and China: A cross-cultural validation of the Academic Emotions Questionnaire-Mathematics (AEQ-M)
Anne Frenzel, University of Munich, *Germany*
Todd Thrash, College of William & Mary, *USA*
Reinhard Pekrun, University of Munich, *Germany*
Thomas Götz, University of Munich, *Germany*

The aim of this study was to establish the construct comparability and cross-cultural utility of the German and Chinese versions of the Academic Emotions Questionnaire-Mathematics (AEQ-M). Based on data from 312 German and 579 Chinese eighth grade students, mean and covariance structures (MACS) analysis revealed that the AEQ-M shows a high degree of measurement invariance across cultures. In addition, the emotions assessed by the AEQ-M showed similar patterns of relationships with self-reports of achievement, parental achievement expectations, and attributions of success and failure across the German and Chinese samples. Confirming earlier findings, Chinese students were found to experience higher levels of anxiety in mathematics. They were also found to experience more enjoyment, pride, and shame, and less anger, than German students. This research supports the use of the AEQ-M in cross-cultural research and provides data about a broader range of achievement emotions than has been investigated previously.

Do intelligent students feel better in testing situations? Emotional experiences of different ability groups during an academic achievement test
Thomas Götz, University of Munich, *Germany*
Anne Frenzel, University of Munich, *Germany*
Reinhard Pekrun, University of Munich, *Germany*
Franzis Preckel, University of Trier, *Germany*
Nathan Hall, University of California, *USA*

This study examined test-related experiences of enjoyment, anger, anxiety, and boredom in a sample of 2,059 6th-grade German school students and how they relate to students' abstract reasoning ability. Emotions were assessed immediately before, during, and after a mathematics achievement test. Analysis of variance showed that emotional experiences during the test situation differed based on students' abstract reasoning ability level, with correspondence analysis revealing substantial differences between the emotional profiles of different ability groups. Enjoyment proved to be most prominent in students with high nonverbal cognitive ability, whereas anger and anxiety were predominant for students with low cognitive ability. Boredom was found to be highest among students in the intermediate cognitive ability group. Implications for research and practice are discussed.

The effects of extrinsic feedback and goal orientation instructions on performance, positive affect, and state anxiety

Fotini Dina, Aristotle University of Thessaloniki, *Greece*
Anastasia Efklides, Aristotle University of Thessaloniki, *Greece*

The present study aimed at investigating the effect of goal orientation instructions (mastery vs. performance) and the extrinsic feedback (EF) valence on students' performance, interest and liking of the task, and anxiety state. There were 870 students of 7th and 9th grade, randomly allocated to one of 7 groups according to the goal orientation instructions and EF valence: Mastery-Positive EF, Mastery-Negative EF, Mastery-No EF, Performance-Positive EF, Performance-Negative EF, Performance-No EF, and the Control Group (no instructions, no EF). Students' personal goal orientations (mastery, performance-approach, performance-avoidance), mathematical ability, and anxiety trait were measured before the experimental treatment. Measures of interest and liking of the task along with other metacognitive experiences were collected before and after solving each of 3 mathematical word problems of increasing difficulty. For each task, EF was provided; state anxiety was measured after solving the 3 problems. A series of ANCOVAs and regression analyses showed that performance instructions led to higher task performance as compared to the mastery or no instructions groups. Interest and liking was increased in the mastery instructions groups, whereas feelings of confidence and satisfaction were increased in the performance instructions groups. Yet, positive affect was also related to students' mastery- and performance-approach orientation regardless of instructions. Negative EF increased state anxiety in the performance instructions groups and less so in the Mastery-Negative EF group; the latter did not differ significantly from the rest of the groups. The highest task performance without state anxiety was in the Performance-No EF group.

Emotion regulation in social learning situation - do students regulate their emotions together?

Hanna Järvenoja, University of Oulu, *Finland*
Sanna Järvelä, University of Oulu, *Finland*

This study investigates students' regulation of emotions while they study collaboratively. The focus is on those socio-emotional challenges, which the students face during collaborative learning and the dynamics of socially shared and individual regulation processes in these situations. Therefore, the concept of self-regulation is complemented with socially shared regulation processes, which broadens the traditional self-focused regulation to social perspective. The aim is to study (1) what kinds of emotional challenges do the social aspects of collaborative learning bring to the learning situation, and, (2) do students use self-, other- and shared-regulation in these socio-emotionally challenging situations? Sixty-three higher education students were studied in groups of 3-5 members during three collaborative learning tasks. The student interpretations of experienced social challenges and their attempts to regulate emotions evoked by these challenges were collected after every task using a dynamic questionnaire instrument. The results showed that the group members experienced varying types of social challenges. These different interpretations did not mean, however, that group members would not share some of the responsibility of their emotion regulation to complement individual self-regulation processes. On the contrary, shared-regulation was reported more often than self-regulation. The results also demonstrated how intrinsic dynamics of groups derive from both individual and social elements of collaborative situations.

A 18
28 August 2007 15:00 - 17:00
Room: 0.100C
Symposium

Achievement goal orientations and well-being

Chair: **Markku Niemivirta,** University of Helsinki, *Finland*
Organiser: **Markku Niemivirta,** University of Helsinki, *Finland*
Discussant: **Monique Boekaerts,** Leiden University, *Netherlands*

Much of the individual variation in achievement behavior can be explained by the different goal orientations students hold or adopt in achievement contexts. Although a large body of research has examined how such orientations relate to various types of academic outcomes, surprisingly little is known about how achievement goal orientations relate to students' subjective well-being, another undoubtedly vital educational outcome. By looking at students' well-being from several different perspectives, this symposium seeks to enhance our understanding of the adaptiveness of adopting certain goal orientations. The presentations in this symposium share an overall framework but differ in terms of the level of specificity and the indices of well-being included. Sideridis and his colleagues examine the simultaneous contribution of goal orientations, feared states, and personality dispositions on the emotional experience and achievement of students with and without learning problems. Barron and his colleagues present findings linking achievement goals and theories of intelligence to various aspects of psychological well-being including personal growth, autonomy, purpose in life, environmental mastery, positive relations with others, and self-acceptance. The longitudinal study by Niemivirta, Salmela-Aro, and Tuominen demonstrates how changes in students' achievement goal orientations, general well-being, and school-related burnout are related to each other across the transition from lower secondary to upper secondary school. Finally, Kaplan and Flum extend the perspective on academic orientations and well-being beyond the domain of the school to general styles of coping with the developmental task of identity formation. The findings reported here evidence the importance of considering outcomes other than achievements when evaluating the consequences of different goal orientations, and thus provide a basis for expanding our view on adaptive student motivation.

Examining the moderating role of goal orientations, fear of failure, and hardiness for the affective experience of students with and without learning problems: An application of the Emotional Stroop Task
Georgios Sideridis, University of Crete, *Greece*
Ioanna Tsigourla, University of Crete, *Greece*
Eirini Fragioudaki, University of Crete, *Greece*
Ioanna Hrakleous, University of Crete, *Greece*
Maria Shiakali, University of Crete, *Greece*
Maria Georgiou, University of Crete, *Greece*
Aggelos Krypotos, University of Crete, *Greece*

This study evaluated the moderating role of goal orientations, fear of failure, and hardiness towards explaining the reaction to emotional stimuli of students' with and without learning disabilities. Participants were 340 elementary school students with and without learning problems (260 typical students and 80 with learning and attention problems assessed using both teacher ratings and the Taylor Complex Figure). Goal orientations, fear of failure, and hardiness were

assessed using self-reports. Clusters of emotional words related to success, failure, persistence, anxiety, positive affect, negative affect, calmness, positive self-esteem, and negative self-esteem were examined as multivariate dependent variables. Using mean splits and a series of 2x2 latent variable analyses, results confirmed the moderating role of the above-mentioned variables. Specifically, students' emotional reaction to achievement-related words was significantly lessened for students with LD and attention problems when hardiness was at high levels, mastery goals were operative compared to performance, and fear of failure was at low levels. However, specific fears of failure, i.e., those related to the influence of significant others, were also negative predictors of negative affect states pointing to their adaptive role. The results confirmed earlier findings regarding the maladaptive role of performance goals (approach and avoidance) for students' emotional experience at school but also pointed to the presence of other moderating variables that are associated with the affective states of students with and without learning problems.

Achievement goals, theories of intelligence, and well-being
Kenneth E. Barron, James Madison University, *USA*
Allison R. Brown, James Madison University, *USA*
Pamela K. Kaliski, James Madison University, *USA*
Sara J. Finney, James Madison University, *USA*

As part of a large-scale university-wide assessment project to assess student development, we began tracking university students' achievement goal orientation, theories of intelligence, and psychological well-being in the beginning of their university careers, as well as in a follow up assessment midway through their university careers. Our presentation will summarize the first wave of results from this work. In addition, we will discuss how we operationalized and measured each of our constructs, and the importance of considering the specificity in which to measure constructs. Specifically, we adopted a multidimensional model of achievement goals that compared mastery-approach, mastery-avoidance, performance-approach, performance-avoidance, and work avoidance goals (Finney, Pieper, & Barron, 2004), and we adopted a multidimensional model of psychological well being that compared personal growth, autonomy, purpose in life, environmental mastery, positive relations with others, and self-acceptance (Ryff, 1989). We also assessed all constructs at the same, general level of specificity to match specificity of predictors and outcomes. Although theories of intelligence and achievement goal orientation were both linked to various psychological well-being outcomes, achievement goal orientation variables were better predictors. We will also highlight the importance of distinguishing between a mastery vs. performance goal focus and an approach vs. avoidance goal focus on university students' psychological well being.

Changes in achievement goal orientations, subjective well-being, and school-related burnout across the transition to upper secondary education
Markku Niemivirta, University of Helsinki, *Finland*
Katariina Salmela-Aro, University of Jyväskylä, *Finland*
Heta Tuominen-Soini, University of Helsinki, *Finland*

The objective of this study was to examine the longitudinal relationships between achievement goal orientations, subjective well-being, and school-related burnout as the students move from lower secondary to upper secondary education. 176 students following the vocational track and 373 students following the general academic track completed questionnaires two times before and once after the transition from the ninth grade. Based on latent difference scores, we found that

changes in motivation and well-being were more positive after the transition than before, and that those changes were more pronounced among the vocational students. Increase in mastery-focused orientations was associated with positive changes in well-being, whereas an increase in performance- and avoidance-focused orientations was related to negative changes in well-being. The findings add to our understanding of the consequences of adopting certain achievement goal orientations, and provide new insights into the question of what constitutes adaptive motivation. Developmental differences between student following different academic tracks will be discussed in terms of person-environment fit.

Middle-adolescents' goal orientations and identity formation styles
Avi Kaplan, Ben Gurion University of the Negev, *Israel*
Hanoch Flum, Ben Gurion University of the Negev, *Israel*

This study aimed at investigating the relations between middle-adolescents' academic goal orientations towards their enhanced subject in high-school and their identity formation styles, and more specifically their coping styles in dealing with identity issues: avoidance, postponing, closed-minded, commitment, and active self-construction. Theoretical hypotheses relate mastery-approach goal orientation to active self-construction, performance-approach goal orientation to commitment and perhaps closed-minded, and performance-avoidance goal orientation to closed-minded and perhaps to avoidance. Data from 284 10th graders were analyzed using multi-dimensional scaling, and suggested that generally, goal orientations were associated with commitment rather than avoidance of engaging in identity issues. However, in addition, mastery-approach goal orientation seem to represent active self-construction, performance goals did not represent identity styles, and mastery-avoidance goal orientation represented a verity of styles including closed-mindedness, self-construction, and even avoidance of engagement in identity issues.

A 19
28 August 2007 15:00 - 17:00
Room: 0.99
Symposium

Practices and cultures of assessment

Chair: **Lucie Mottier Lopez,** University of Geneva, *Switzerland*
Organiser: **Lucie Mottier Lopez,** University of Geneva, *Switzerland*
Discussant: **Linda Allal,** University of Geneva, *Switzerland*

It is generally acknowledged that the multiple, embedded contexts of teaching-learning practices may constraint of facilitate educational change (e.g., Shepard, 2001). The symposium will focus on classroom assessment (formative or summative) tied to "cultures" conceptualized at different levels: (a) classroom microcultures in terms of norms and practices co-constructed during teacher-students formative interactions in mathematics education (Mottier Lopez), (b) subject matter cultures, in particular teaching English as a foreign language with the implementation of a new pragmatic approach to language learning in secondary school (Raby & Campanale), (c) teachers' expectations, conceptions and practices tied to a national educational reform in primary school (Grange), (d) teachers' assessment practices and grade retention decisions in primary school in

three different countries (Crahay & Marcoux). To what extent can we speak about "assessment cultures"? How to define them? What are the relations between these cultures and the curricular materials used by the teachers, their everyday classroom practices, and the decisions of grade retention and social promotion? To what extent do we note contradictions, conflicts, coherence, co-construction? What are the impacts on students' learning and on their school failure and success? Which strategies of change can we conceive? The scientific aim of the symposium is to investigate social and cultural dimensions of the classroom assessment through teachers' discourses, tools that are used, and professional practices in school settings. On a practical level, the symposium is aimed at producing knowledge that would be useful for supporting deep changes of practices and cultures of assessment.

Formative assessment practices situated in classroom microcultures
Lucie Mottier Lopez, University of Geneva, *Switzerland*

It is generally acknowledged that learning gains are possible when formative assessment is introduced into classroom practices. But as stressed by Black and Wiliam (1998), it is essential that each teacher finds his or her own way of incorporating formative strategies into his or her own patterns of classroom work. We will argue that the norms and practices of classroom microcultures (Yackel & Cobb, 1996) are important contextual factors for this incorporation. In our paper, we will focus on the interactive regulations of formative assessment based on the exchanges between the teacher and the student(s) (Allal, 1988). The integration of interactive regulation within an instructional activity allows continuing adaptations of learning as it takes place. Taking into account the "social norms" of the classroom microculture allows to investigate in detail the nature of teachers' feedback and adaptations of learning. Our main research questions are the following: which strategies of interactive regulation does the teacher use when observing difficulties of students during problem-solving activities? What are the relations between the social norms of the classroom microculture and the nature of the interactive regulations guided by the teacher? Our results concern two third-grade classes in mathematics education. We will discuss the kind of interactive regulation displayed by each teacher in relation with the social norms of her/his classroom microculture. We will show how the formative assessment practices of both teachers promote more or less a shared responsibility of the assessment with their students. Interpretative hypotheses will be formulated concerning the impact on the learning gains.

Inconsistent cultures of foreign language evaluation: When teachers find themselves tangled up by conflicting values and objectives
Francoise Raby, IUFM & LIDILEM Universite Stendhal de Grenoble, *France*
Francoise Campanale, IUFM & LSE Universite Pierre Mendes France de Gren, *France*

This empirical qualitative research dealt with the "assessment culture" of three French language teachers coming from different secondary schools and with different professional careers, who sought to implement the new pragmatic approach to language learning recommended by the European Framework. This approach consists in setting up "pragmatic" tasks in which the foreign language is learnt in order to communicate in socially meaningful situations, such as those afforded by the Internet, and the assessment procedures should follow these new lines. To what extent has this new culture of assessment reached those French teachers? Did the fact that they resorted to ICT pedagogy influence their assessment theories and practice? In order to bring elements of answers to these questions we shall borrow from the current international theories of assessment, particularly the French-speaking school, which emphasizes the need for explicit evaluative criteria pertaining to tasks, competences and the distinction between assessment and

control. The French school also provides relevant concepts and methods for the modelling of assessment situations, such as the one used to interview pupils with a view to stimulating self-regulative and self-assessment procedures. In order to elicit the three teachers' "assessment culture" we implemented the methodology of triangulation which recommends the use of multiple data sources in order to overcome the biases that spring from a single datum. Three main findings emerged from the discourse analysis of the teachers' interviews, from the video-transcripts collected during the implementation of their ICT project, and from the teachers' paper assessments. First, while they belonged to the category of innovators in terms of teaching strategies the teachers expressed traditional conceptions of assessment. Secondly, their conceptions and practice of assessment were unstable, sometimes contradictory. Thirdly, the ICT medium seemed to favour interactive assessment rather than retro-active evaluation. More fine-grained data processing and interpretations are underway.

Assessment culture and teaching choices. Conceptions and practices at primary school.
Teresa Grange, Universita della Valle d'Aosta, *Italy*

A recent educational reform in Italy, which also focuses on classroom assessment, has led to much criticism and debate, notably about training theories and underlying ideology, teachers' conceptions, practices and experiences. These points are fundamental, so as to consider an 'assessment culture' which underpins the creation of didactic projects, formative interventions, decision-making, and school failure and success. In the light of reactions aroused by the reform, we conducted a survey in primary schools in Valle d'Aosta (Italy).The research focused on the following aspects: Teachers' attitudes regarding classroom assessment, teacher's conceptions about the functions of assessment, and finally, concepts and tools used by teachers for assessment purposes. The aim of the survey is to investigate the relation between assessment culture and practices in school settings. Our research was carried out in primary schools which represent the system level the most affected by the educational reform. A total of 50 teachers were interviewed, and they also filled a questionnaire of 75 items based on a Likert scale. The level of agreement or disagreement expressed by the teachers emphasized various aspects of classroom assessment and the different teaching practices related. Our results stress a non-homogenous assessment culture, even though we also identify significant trends, in particular that the function of assessment, first summative, appears to be detached from learning purposes. Teachers seem to grasp the complexity of classroom assessment, but we note a conceptual gap between assessment conceptions and teaching-learning practices.

Culture and teachers' assessment practices leading to grade retention decisions in three different countries
Marcel Crahay, University of Geneva, *Switzerland*
Gery Marcoux, University of Geneva, *Switzerland*

In numerous countries, teachers continue to perceive grade retention as effective, and persist in making decisions of pupils' retention. This study aims at (1) analysing teachers' pedagogical beliefs in relation to grade retention; (2) comparing teachers' conceptions from three different countries - one of them, at two different moments. More precisely, two dimensions of these conceptions will be the target of our analysis: factors influencing the decision-making favouring or not favouring grade retention and attributions process of school failure causes. An inquiry by interview was carried out with teachers from three different countries: Belgium (2004-2005), Switzerland (1994 and 2006) and Madagascar (2006). The same protocol was used four times. The originality of our study is to focus on specific cases of grade retention. Teachers were interrogated

about their own grade retention decisions made at the end of the school year preceding the interview. We chose 11 Genevan primary school teachers in 1994 and 16 in 2006, 15 Belgian primary school teachers, and 18 Malagasy teachers. Our analysis shows a general uniformity of teachers' conceptions. Despite the specificities of malnutrition, families' poverty, overcrowded classrooms in Madagascar, we observe common tendencies concerning: Maturation, sociocultural environment, psychological state and readiness. Further, the relative weight of grades in the decision-making and the tendency to the external allocation of school failure are confirmed in these three countries but with shade of meaning. Finally, from a methodological viewpoint, our analysis accounts for possible bias of these interviews, in particular concerning the Malagasy data.

A 20
28 August 2007 15:00 - 17:00
Room: 0.79 Jánossy
Symposium

Academic success: contributions of various theoretical and empirical approaches

Chair: **Mariane Frenay,** University Catholic of Louvain, *Belgium*
Organiser: **Mariane Frenay,** University Catholic of Louvain, *Belgium*
Organiser: **Sandrine Neuville,** University Catholic of Louvain, *Belgium*
Discussant: **Chris A. Wolters,** University of Houston, *USA*

For decades, students' academic achievement in postsecondary education, also referred to as students' achievement behaviours, has preoccupied psychological and educational researchers. Historically, student' social characteristics (i.e., ethnic background, gender, socioeconomic status) and academic background (i.e., previous ability, test-scores, grade-repeating history) have been the only variables that were used to predict academic achievement (Pascarella & Terenzini, 2005). Nearly 30 years ago, researchers became aware of the necessity to consider other dimensions as well in order to have a fuller understanding of the process leading students to success versus failure in their studies (Farsides & Woodfield, 2003, Gloria & Ho, 2003; Lee & Burkam, 2003). The aim of this symposium is to discuss different theoretical models focusing on academic success in order to enhance the understanding of their specific contribution. Paper one investigates the extent to which different factors (attitudes, beliefs, expectations, skills…) influence students' choice - which is important for academic engagement - to make career decisions while in school. Paper twois interested in the study orientations of student teachers. The two research questions are: 1) What kinds of study orientations will be discovered among the students attending a course in educational psychology? 2) What variables predict the learning outcomes? Paper three focuses on the link between students' Future Time Perspective (FTP) and self-regulatory strategy use, which is positively related to academic success (Bell & Kozlowski, 2002; Zimmerman, 2000). More specifically, effects of students' dispositional tendencies to make connections between the present and the future (dispositional aspect of FTP) and effects of the actual instrumentality of an activity (situational aspect of FTP) are investigated. The purpose of paper four is to confront the explanatory power of two literatures concerning students' academic performance: on the one hand, Tinto's academic and social integration model and on the other hand, expectancy-value paradigm.

Factors influencing the choice of a major in Information Technology
Angela O'Donnell, State University of New Jersey, *USA*
Nicole Di Donato, University of california, *USA*

Recent changes to the nature of the Information Technology (IT) field coupled with a growing IT industry have led to an increase in the demand for qualified IT professionals. On the other hand, according to the National Science Foundation (Retrieved on June 3, 2006), the number of students earning PhD degrees in computer science at the top 50 universities is the lowest it has been in 12 years. Similarly, enrollment at the top 50 universities for electrical engineering plummeted to the lowest it has been in 16 years (Nelson, 2004). Because universities serve as a major supplier of professionals to the IT workforce, research at the college level is necessary to understand the factors that influence students to make career decisions while in school. The purpose of this paper is to determine the factors that influence college students to major in Information Technology and pursue technology-related careers by comparing students in IT and non-IT majors. Results suggest that students make career decisions based on self-efficacy expectations about future careers in technology, mathematical mastery skills, outcome expectations about characteristics of such careers, and the influences of family and/or friends. Understanding students' beliefs and perceptions will create knowledge that can be used for interventions and programs that specifically may serve to increase the number of students pursuing IT careers and more generally help students in making career decisions.

Study orientations of student teachers
Kirsti Lonka, University of Helsinki, *Finland*
Annamari Heikkila, University of Helsinki, *Finland*
Saija Sappinen, University of Helsinki, *Finland*

The goal of this study was to investigate study orientations among teacher students attending an introductory course in educational psychology and to find out the factors that were related to learning from this course. Study orientations or learning styles describe somewhat permanent ways of how students understand and approach learning and studying. Study orientations are comprised of various elements. The research problems in this study were: 1) What kinds of study orientations were discovered among the students attending a course in educational psychology? 2) What variables predicted the learning outcomes? The participants (n = 110-138) were mainly class teacher students and kindergartner teacher students who participated in an introductory course in educational psychology. The data were collected by using a questionnaire measuring conceptions of learning and knowledge, thinking strategies and attributions, approaches to learning, exhaustion and stress, self regulatory skills, interest, and anxiety. The results of a knowledge test and the final course examination were the learning outcome measures. A first-order principal component analysis with varimax rotation was performed to explore the study orientations of the participants. The background variables were the program, gender, age, lecture activity, prior knowledge, interest, independent study time, study experience, and goals. Also academic emotions, such as stress, exhaustion and anxiety, were examined in relation to the learning outcomes. Regression analyses were applied to see which variables predicted the learning outcomes. The results showed that students expressed four different study orientations: cook book-, meaning making-, collaborative- and dysfunctional orientations. Optimism, strategic planning and interest in educational psychology were found to explain the learning outcomes. Believing in certain knowledge was negatively related to the learning outcomes.

When learning seems (un)important: Future Time Perspective and post-secondary students' self-regulatory strategy use.
Jenefer Husman, Arizona State University, *USA*
Christa Lynch, Arizona State University, *USA*
Jonathan Hilpert, Arizona State University, *USA*
Wonsik Kim, Arizona State University, *USA*
Mary Anne Duggan, Arizona State University, *USA*
Wen-Ting Chung, Arizona State University, *USA*

Research on post secondary students' Future Time Perspective (FTP) has focused on both its dispositional (Shell & Husman, 2001) and situational (Simons, Dewitte, & Lens, 2000) aspects. Dispositional aspects of FTP include connectedness (tendencies to link the present and future), speed (how manageable the future seems), and extension (how far into the future thoughts extend). A situational construct within FTP is students' Perceptions of Instrumentality (PI). PI is the perception that a particular activity is critical for the achievement of a valued future goal and is dependent upon the actual activity and students' dispositional tendencies to make connections between the present and the future (Husman & Lens, 1999). This correlation study of 276 university students provides evidence that students' connectedness and PI account for 24% to 54% of the variance in their reported use of learning strategies. We also provide evidence that when coursework has obvious connection with students' future goals, the relationship between FTP and use of learning strategies is stronger than when coursework is less instrumental. According to FTP theory students' perceptions of instrumentality are a product of their dispositional tendency to find connections between the present and the future and the actual utility of an activity (Husman & Lens, 1999). The research discussed here provides some evidence for the proposed interaction between dispositional and situational aspects of FTP.

Tinto's theoretical perspective and expectancy-value paradigm: a confrontation to explain freshmen academic achievement .
Sandrine Neuville, University Catholic of Louvain, *Belgium*
Mariane Frenay, University Catholic of Louvain, *Belgium*
Julia Schmitz, University Catholic of Louvain, *Belgium*
Gentiane Boudrenghien, University Catholic of Louvain, *Belgium*

Many research have tried to understand the process leading students, who are entering for the first time into higher education, to succeed in their studies versus to fail (Pascarella, 2005 ; Cooke, Brakham, Audin & Bradley, 2004). In this respect, Tinto's academic and social integration model (1982, 1987, 1997) is one of the most often cited model. This model postulates that students background characteristics, initial intentions and aspirations influence students persistence/dropout in academic settings as well as academic results. The explanation Tinto proposes is organized around the concepts of academic and social integration, that is to say the student's subjective perception to find his or her place harmoniously in the academic and social life of the academic institution. Unfortunately, even if this model is an integrative one, it doesn't take into account motivational variables, such as students' self-efficacy (Bandura, 1997 ; Bong & Skaalvik, 2003) and students' subjective value of academic tasks (Eccles & Wigfield, 2002 ; Neuville, Bourgeois & Frenay, 2004), when their impact on learning has been widely proved (Robbins et al. 2004). The purpose of this study, conducted with 2637 first-year university students from all Bachelors programs of a Belgian university, is to confront the explanatory power of these two literatures concerning students' academic performance. Three structural equation models will be compared: 1) the first one exclusively based on Tinto's theoretical perspective, focussing on social and

academic integration variables as key factors to explain academic achievement 2) a second one testing the effects of motivational variables 3) finally, an integrative model, combining both social and academic integration and motivational variables as explanatory factors of academic achievement.

A 21
28 August 2007 15:00 - 17:00
Room: 0.100D
Symposium

New approaches to investigating epistemological beliefs

Chair: **Hans Gruber,** University of Regensburg, *Germany*
Chair: **Barbara Moschner,** University of Oldenburg, *Germany*
Organiser: **Hans Gruber,** University of Regensburg, *Germany*
Organiser: **Barbara Moschner,** University of Oldenburg, *Germany*
Discussant: **Helge Strømsø,** University of Oslo, *Norway*
Discussant: **Christian Brandmo,** University of Oslo, *Norway*

New approaches to investigating epistemological beliefs Symposium Hans Gruber and Barbara Moschner Epistemological beliefs are individuals' fundamental assumptions about knowledge, its nature, and appropriate ways to create it. Thus, individuals' epistemological beliefs influence their ways of dealing with and solving problems, especially if new approaches and heuristics are required. In this way an understanding of these beliefs is relevant for understanding learning, irrelevant of the setting in which learning occurs. Most research has been done in formal educational settings like schools or universities, but recently an interest has grown in analysing the role of epistemological beliefs for implicit learning which is typical for professional learning and learning at the workplace. The discussion about appropriate methodological approaches how to assess epistemological beliefs is at its very beginning, given that the nature of knowledge, knowledge acquisition, individual responsibility for one's own development and the role of supra-individual units as communities of practice or expert networks is quite different in school settings and in work settings. The proposed symposium intends to intensify this discussion. It brings together a number of researchers from different countries who have been investigating the potential of epistemological beliefs from different methodological perspectives and with a background in different learning and working areas. A number of the participants are member in the international "REB-Net" (Research on Epistemological Beliefs Network). Presenters: (1) Denise L. Winsor and Lisa D. Bendixen (USA) (2) Stephen Billett (Australia) (3) Christian Harteis (Germany) (4) Silke Schworm and Hans Gruber (Germany) (5) Barbara Moschner and Hans Gruber (Germany) (6) Discussant: Christian Brandmo (Norway) (7) Discussant: Helge. I. Strømsø (Norway)

Studying personal epistemology in preschool children using focus groups
Denise Winsor, University of Nevada, *USA*
Lisa Bendixen, University of Nevada, *USA*

This is a qualitative study designed to use focus groups as a means of identifying the personal epistemologies of preschool children in an authentic learning environment. Personal epistemology

is generally defined as the theory about the nature of knowledge and the process of knowing. Investigations of young children are scarce in this field and little is known about the early onset of epistemological development. We look closely at very young children and how their cognitive ability and interactions with peers may reveal information regarding epistemological development. The aim of this study is two-fold: (1) to investigate virtually undocumented research regarding 3- to 4-year-olds' demonstration of personal epistemology, and (2) to assess their affect, language, and relationships utilizing peer focus groups. This study has been previously piloted to refine the participant selection and epistemological questioning protocol. Focus groups are rarely utilized with children; however they provide a platform for the investigators to capture the essence of the children's knowledge in their own words. The study has six child-participants; they are divided into two groups of three and are involved in a total of six focus groups each over a six week period. Preliminary results of data analysis suggest that focus groups provide a unique and abundant source of epistemological insights. This study stands to promote theoretical and educational advancements in the field in general and with the research of young children specifically.

Personal epistemologies, work and learning
Stephen Billett, Griffith University, *Australia*

This paper elaborates concepts of epistemologies beliefs and how they are exercised in and developed through individuals' engagement with paid work. It proposes that elaborating personal epistemologies is central to understanding how individuals engage in activities such as paid work, how they learn through those experiences and go onto remake their work activities. So their role in both individual and cultural change is elaborated. These epistemologies are seen here as individuals' ways of knowing and acting that arise from their capacities, earlier experiences and negotiations with the social and brute world. Importantly, they do much to shape how individuals construe and construct what they experience. In this way, they can be seen the exercising of individuals' subjectivities. Yet, through that exercise these epistemologies are also refined, reinforced and transformed when engaging in activities, such as paid work. The paper draws on investigations of learning through work in a range of occupations in order to discuss the character and role of personal epistemologies at work. It concludes by suggesting a central role for these epistemologies in situations where social affordances (e.g. support) are relatively weak. For instance, older workers and those working in socially or physically isolated circumstances may need to rely upon their personal epistemologies.

Do students of natural sciences and students of social sciences differ in their cognitive style?
Christian Harteis, University of Regensburg, *Germany*

Epistemic beliefs reproduce subjective assumptions about the nature of knowledge. One parameter of epistemic beliefs is the preferred way of acquainting oneself with new insights. An instrument to assess such a basic way of interpreting the world is the Cognitive Style Index (Allinson & Hayes, 1996), which indicates whether subjects prefer an intuitive-heuristic or a rational-analytic way of thinking. Evidence supports the assumption that people from different professional domains differ in their CSI scores. This contribution includes an empirical study conducted with 71 teacher students of different domains (natural and social sciences) from two different German universities. Students of natural sciences are supposed to focus on rational-analytical thoughts whereas students of social sciences also include and train philosophical and heuristic approaches. Additionally, people in the two investigated regions within Germany frequently are supposed to differ in individual traits. Contra-intuitively, no significant differences between could be observed.

Academic help-seeking: The influence of goals, beliefs, and learning strategies
Silke Schworm, University of Regensburg, *Germany*
Hans Gruber, University of Regensburg, *Germany*

Academic help-seeking can be seen as motivated information processing concerning one's own learning and knowledge acquisition. Thus, individual interpretations of the components involved play a major role. Of particular relevance are one's interpretations about the nature of knowledge (epistemological beliefs), about useful learning strategies and about matter which is worth to invest some effort (goal orientation). It is investigated to what extent university students' attitudes towards help-seeking are related to their epistemological beliefs, goal orientations and learning strategies. Two studies are reported, a questionnaire study and a quasi-experimental study. Results of study 1 (N=210 students) reveal that students with a positive attitude towards help-seeking believe that knowledge is absolute and objective, but not that the ability to learn is fixed. However, the belief that ability is fixed predicts avoidance of help-seeking. Striving for mastery goals and openness to admit weaknesses leads to a positive attitude towards help-seeking, while the intentions to hide missing competences and to avoid mastery goals predict the avoidance of help-seeking. Help-seeking as a resource-based learning strategy is positively correlated with the use of cognitive and meta-cognitive strategies and with cooperative learning strategies. Based on these results, study 2 was designed. Students of a blended learning seminar in educational science (N=39) were divided into two groups both having access to a virtual workspace. In one group active help-seeking behaviour was fostered but not in the other. Results show that the prompts foster learning outcome. Students prompted on help-seeking participated more actively in forums. More contributions on the learning content as contrasted to organisational aspects of the course are posted and more questions are asked.

Three-stage development of a revised epistemological beliefs questionnaire
Barbara Moschner, University of Oldenburg, *Germany*
Hans Gruber, University of Regensburg, *Germany*

Although theoretical interest and empirical research in the area of personal epistemology have grown tremendously in the past years, key issues in this field are still not resolved. These issues concern the definition of epistemological beliefs, boundaries of the construct, and appropriate measurement. We present a three-stage development of a questionnaire for epistemological beliefs which integrates different lines of research. Epistemological beliefs were conceptualised as a broad construct, including for example beliefs about gender related ways of knowing and about the cultural bound nature of knowledge. These dimensions are discussed in the literature, but have not yet been thoroughly addressed as dimensions in questionnaires. A pilot study with a newly developed first questionnaire was conducted during a summer-school of the "Studienstiftung" (German National Academic Foundation). Subjects were 104 scholars of the Studienstiftung. Based on exploratory factor analyses and internal consistency estimates of reliability we identified ten sub-scales, which were considerable different from Schommer's scales. The results encouraged us to revise the questionnaire. In a second study, the revision (second questionnaire) was administered in an online-study. The sample included 365 females and 143 males. Exploratory factor analyses identified seven sub-scales, which proved to be highly reliable. Sub-scales were: absolute knowledge, learning to learn, relativity of knowledge, gender-related ways of knowing, cultural bound nature of knowledge, silence of knowledge, and innate ability. In our third study, a reduced version of the second questionnaire was administered in three different German universities (third questionnaire). Subjects in this sample were 1508 students enrolled in different

of majors. Preliminary analyses confirm our sub-scales. In a next step we want to look at epistemological beliefs in relation to measures of learning strategies and learning outcomes.

A 22
28 August 2007 15:00 - 17:00
Room: 0.83 Eötvös
Symposium

Problem- and case-based learning environments

Chair: **Heinz Mandl,** University of Munich, *Germany*
Organiser: **Heinz Mandl,** University of Munich, *Germany*
Discussant: **Filip Dochy,** Catholic University of Leuven, *Belgium*

Problem-based and case-based learning are learning methods which are widely and differently used. In both methods learners get complex problems they have to solve - often collaboratively. These problems make active content processing and concrete activities of the learner necessary. Mostly, problems and cases are embedded in a situation close to reality and therefore cases are differently complex. The main purpose of problem- and case-based learning is to avoid the acquisition of inert knowledge and to foster the acquisition of knowledge applicable in different contexts and situations. This knowledge application aspect gains more and more importance in the context of life-long learning and of learning efficiency. Last but not least this issue was also discussed in the context of the PISA results. Therefore, problem- and case-based learning is of great importance for education. This symposium focuses on the analyses of different learning environments in which learners had to solve complex problems or cases. These problems demand problem solving activities of the learners to deepen their knowledge acquisition. Yet, learning in such scenarios is often not easy for the learners. Therefore, the most interesting point is how learners engage in active learning processes when dealing with complex problems and cases. Therefore, we are interested in learning processes and learning outcomes as well as in support methods of problem- and case-based learning. The first two contributions take a closer look at learning processes and learning outcomes over time in a university course and in a professional training course. The next two contributions investigate higher order thinking processes when using cases in science and the last two contributions take a closer look at support methods in different learning environments.

Problem-based learning in a virtual seminar: Cognitive activities, case solutions, and group comparison
Birgitta Kopp, University of Munich, *Germany*
Heinz Mandl, University of Munich, *Germany*

This paper deals with the analyses of collaborative problem-based learning in the virtual seminar "Introduction into Knowledge Management" over a long period of time. Learners had to collaboratively solve four different problems on knowledge management together in a virtual learning environment. Each of these problems was introduced with a real-life case on a main knowledge management topic to include authenticity. To get further insight into the virtual learning activities, the contributions of the asynchronous communication were analysed according to three relevant cognitive activities: epistemic activities, dissemination of shared knowledge, and

conflict-orientation. Learning outcome in the form of the problem solutions was measured, too. In this respect, we analyzed conceptual and situative knowledge. Thirteen undergraduates were enrolled and three groups formed. Learners had to solve the four problems consecutively over the whole semester. Results show that in problems two and three learners concentrated more on content-specific activities, were more effective in integrating disseminated information in their problem solution, reduced conflict-orientation when discussing facts, and increased it when discussing the problem solution. Therefore, the quality of the problem solutions increased, too. Correlation analyses could prove these interrelations. Comparing the three groups, we found that learners of group 2 had more difficulties to adapt their learning activities to problem-based virtual learning than learners in groups 1 and 3.

Case-based learning in virtual groups - problem solving activities and learning outcomes in a virtual professional training
Melanie Hasenbein, University of Munich, *Germany*
Birgitta Kopp, University of Munich, *Germany*
Heinz Mandl, University of Munich, *Germany*

This paper deals with the analysis of the problem solving activities and learning outcomes in a virtual professional training. 18 participants took part in this training and were formed in five groups which had to solve two different cases. The first case "Metallina" was a predetermined case of the metal industry where the problem and the information were given. The participants also got a detailed instruction how to handle this case. The second case was a real case chosen by the group members themselves from their professional context. Here the groups didn't get such a detailed instruction as in the first case. To measure the effects of the problem solving activities the learners' contributions were analysed regarding to the four different problem solving activities: "gathering information", "developing a solution", "planning the common proceeding" and "steering the interaction process". To evaluate the learning outcomes two qualities of knowledge, the conceptual knowledge and the situative knowledge, were analysed. Results show that the learning process of the different cases is dominated by the two central problem solving activities "developing a solution" and "steering the interaction process". Furthermore the results prove that the groups show more overall problem solving activities within the real-case than within the first case "Metallina". At last the collaborative learning outcomes of the more complex real-case differ more than the learning outcomes of the first case "Metallina".

Authenticity of cases in context-based science education
Albert Pilot, University of Utrecht, *Netherlands*
Marijn Meijer, University of Utrecht, *Netherlands*
Astrid Bulte, University of Utrecht, *Netherlands*

The use of authentic cases and tasks is a promising idea for their effect to provoke higher order learning, but it is not easy to design and implement this idea with enough quality in regular teaching. Design of instruction with authentic cases involves the full design of the curriculum unit, especially the relation of the unit in the chain of learning goals and activities in the full curriculum. We aimed at a better understanding of an conceptual design for curriculum units that embodies a coherent framework based on authentic practices (Bulte et al., 2005). Using this framework we studied how a context-based (chemistry) curriculum can be constructed, based on authentic cases. We focused on pre-university chemistry education and the subject of micro-macro thinking using structure-property relations (Meijer et al., 2005). The research question was: to what extent did the elaboration of this framework lead to meaningful learning of micro-macro thinking using

structure-property relations? Design based research was used to analyse and improve the effectiveness of the design principles and the framework. The design of a teaching learning sequence within the unit is based on a theoretical and empirical basis (a study of the authentic practice of chemists in this subject). The detailed design of the teaching and learning process was elaborated in a set of argued expectations about the functioning of the unit, predicting and theoretically justifying. These expectations were used for the planning of the evaluation. The results of the study provide evidence for the effectiveness of (elements of) of the theoretical framework of design principles when using authentic cases. The results also show that students have difficulties in learning and using the abstract concepts of the meso and submicro structures

The role of tutoring behavior and learners' expertise in Problem-Based Learning
Ulrike Unterbruner, University of Salzburg, *Austria*
Joerg Zumbach, University of Salzburg, *Austria*
Bärbel Ditton, University of Heidelberg, *Germany*
Karin Haider, University of Salzburg, *Austria*

In this contribution we examine the role of tutoring behavior and learners' expertise in Problem-Based Learning. Problem-Based Learning (PBL; cf. Zumbach, 2003) is an interdisciplinary, collaborative, and situated learning approach that contributes to meaningful and successful learning and teaching within authentic learning environments. Nevertheless, several factors directly and indirectly affect problem-based learning, such as case or problem design, learning group characteristics, the role and expertise of tutors, and learner characteristics. The research presented here addresses issues of tutoring behavior and the level of students' expertise within a Blended Learning PBL-scenario. In a 2x2-designed experiment, we analyzed the influence of tutor characteristics (tutors with expertise vs. tutors without expertise within the learning domain) on learners with different levels of prior knowledge (beginners vs. advanced learners within the learning domain). While our prior studies on novice learners revealed advantages of expert tutors on learners' knowledge acquisition, the research presented here reveals some benefits of non-expert tutoring in problem-solving groups with advanced learners.

Problem-oriented learning and reflection prompts in teacher education: Enhancing knowledge about cooperative learning
Ulrike-Marie Krause, University of Saarland, *Germany*
Robin Stark, University of Saarland, *Germany*

Although cooperative learning can promote knowledge acquisition, social aspects, and motivation, group work in class is rather scarce and sometimes lacks efficiency because of inadequate implementation. Therefore, we conceived an e-learning environment ("EULE") on cooperative learning for teacher education. Starting point were reports of teachers and teacher trainers and results of a questionnaire study (N = 156 students of education) that investigated students' concepts of cooperative learning, especially misconceptions and dysfunctional beliefs (e.g., fundamental objections or naïve advocacy). EULE explicitly refers to these concepts and systematically displays theoretical considerations, empirical findings, and practical hints in order to enhance knowledge on cooperative learning and promote conceptual change. The learning environment is supposed to bridge the gap between theory and practice, therefore the didactical approach follows principles of problem-oriented learning: Instruction is based on authentic problems and includes multiple perspectives and contexts; also, the students are instructed to apply their knowledge to realistic tasks related to lesson planning. Furthermore, diverse learning aids are provided, such as different task and feedback formats and a glossary. In a small field experiment,

additional reflection prompts were implemented in order to encourage mindful processing of subject matter. N = 12 students were prompted to ask questions, give their opinions etc. while working with EULE, N = 11 students dealt with EULE without reflection prompts. First results revealed significant and substantial learning gains in both groups; students in the reflection condition, however, were only descriptively more successful. Interest in the topic was high both before and after the learning phase. Findings also indicated that conceptual change was incited concerning some misconceptions about cooperative learning. A broader field study involving a sample of about 300 students is currently prepared. We again investigate effects of reflection prompts; also, we examine the helpfulness of systematic student activation through interactive tasks.

A 23
28 August 2007 15:00 - 17:00
Room: 0.100B
Symposium

Do instructional methods matter?

Chair: **Kurt Reusser,** University of Zurich, *Switzerland*
Organiser: **Christine Pauli,** University of Zuerich, Institute of Education, *Switzerland*
Organiser: **Tina Seidel,** IPN Leibniz-Institute for Science Education, *Germany*
Discussant: **Cornelia Gräsel,** Bergische Universität Wuppertal, *Germany*

The TIMSS Video Studies resulted in a growing interest in teaching patters as a feature of teaching quality. Thereby, video studies in mathematics and science education identify teaching patterns by analyzing instructional methods or the social organization of classrooms - and, thus, focus on the analysis of sight structures in teaching. When linking those analyses of teaching patterns to developments in student learning, ambiguous results are found. In most cases, no substantial impact of patterns in instructional methods on students' cognitive or motivational-affective is found. Does this mean that instructional methods are irrelevant to teaching and learning? No. However, the results are puzzling and researchers recognize that more research is needed with regard to the interplay of instructional methods and additional quality indicators such as cognitive activation, quality and clarity of learning tasks, and quality of teacher-student interactions. In this discussion leading questions are: What is the scope and the boundary of certain instructional methods in providing students opportunities to learn? What differences are found when teachers who use the same instructional method are being compared with regard to other quality indicators of teaching? What happens if specific instructional methods are being implemented in classrooms while other quality indicators are being kept constant? The symposium focuses on the interplay of instructional methods with additional quality indicators of teaching, and on the effects of these interactions on student learning progress. Researchers from different countries discuss the results of their studies with regard to the questions outlined above. All of them share the approach of investigating instructional methods and additional quality indicators of teaching by video analysis. Thus, their results are based on rich video data bases in mathematics and science teaching, as well as on linking video analysis with additional measures on student perceptions and student competencies.

Instructional methods and their relationship to other quality indicators of teaching: A study on the interplay of student centered instructional methods, goal clarity and process-oriented teaching
Inger Marie Dalehefte, IPN - Leibniz-Institute for Science Education, *Germany*
Tina Seidel, IPN Leibniz-Institute for Science Education, *Germany*
Constanze Herweg, IPN Leibniz-Institute for Science Education, *Germany*
Rolf Rimmele, IPN Leibniz-Institute for Science Education, *Germany*
Manfred Prenzel, IPN Leibniz-Institute for Science Education, *Germany*

The study presented argues that teaching scripts might be best described by combining different criteria. It is argued that student orientation and goal clarity is an important element both in teacher and student centered classroom organizations. Thus, teachers have the freedom to use different instructional methods. However, independent of which method they use teaching has to be oriented towards the individual learning processes of the students and has to be clear with regard to teaching and learning goals. In order to describe teaching scripts using multiple criteria, three aspects of teaching are focused: 1) student centeredness in instructional methods, 2) lesson clarity and coherence, and 3) teaching related to learners' process/student orientation. The randomized sample includes video taped teaching units of 50 German and 32 Swiss (German speaking) 9th grade science classes. Over the school year 2002/2003 (Germany) and 2003/2004 (Switzerland) each class was videotaped in a curricular physics unit of two lessons. Information about individual learning processes was gathered with tests and questionnaires subsequent to the videotaped lessons. Using the method of Latent Class Analysis three teaching patterns were described that vary along the dimensions of student centeredness, lesson clarity and coherence, and student orientation. The first pattern shows a somewhat undirected und unclear approach to teaching in which teachers use student centered instructional methods from time to time. At the same time the lessons are medium in lesson clarity and low in learner orientation. The second pattern is characterized by student centered instructional methods with quite high lesson clarity and high student orientation. The third script is characterized by a high amount of teacher centered methods. However, these lessons are also very high in student orientation, indicating that teachers were able to orient their teaching towards the individual learning processes of the students.

Coping with authority in two sixth grade mathematics classrooms: Who's in charge?
Fien Depaepe, University of Leuven, Dep. Educational Sciences, *Belgium*
Erik De Corte, University of Leuven, Dep. Educational Sciences, *Belgium*
Lieven Verschaffel, University of Leuven, Dep. Educational Sciences, *Belgium*

It is assumed that mathematical learning is influenced by both individual and social processes, and that both kinds of processes are interwoven with each other (Cobb & Yackel, 1996). We conducted a seven-month-long case study in two sixth grade classrooms in order to document this relationship between the social and the individual dimension of mathematics learning. The first aim of our study was to identify how the classroom norm "who's in charge in terms of making mathematical contributions?" develops through classroom practices. Our second aim was to link the emergence of this norm in classroom mathematical practices with individuals' conceptions of who's in charge in their classroom. Through classroom observations and teachers' and students' interviews, we focused on three aspects of teacher-student interaction from an instructional point of view: (1) who was allowed to judge the correctness or legitimacy of students' responses, (2) students could ask for help to whom, and (3) who was allowed to answer their questions. We observed a different pattern with regard to these authority aspects in the two teachers' instructional approaches. Besides, we obtained significant differences between the two classes in students'

conceptions about who is granted authority in their classrooms with regard to 'evaluating students' responses' and 'answering students' questions', but not for 'asking for help'.

Multiple implementations of a lesson plan: From surface features to basic dimensions of instructional quality
Eckhard Klieme, German Institute for Intern. Educational Research, *Germany*

Within a Swiss-German study on instructional quality in math education (see Pauli et al.), four out of 40 teachers - by chance - made use of identical teaching methods when introducing the Pythagorean theorem to their students. Each of those teachers implemented a lesson plan and related material (e.g., ready-to-use work sheets) that had been published shortly before in a professional journal for math teachers. The lesson plan suggested that students should (a) work in groups, using the work sheets to explore different cases (triangles), (b) share findings with other groups, (c) engage in classroom discourse to generate a general hypothesis (ideally the Pythagorean theorem), (d) work in groups again to check the hypothesis in different cases. Altogether, the four classes outperformed other classes in an immediate posttest, even after controlling for pre-knowledge. However, discourse analysis as well as ratings of instructional quality indicate differences between those four implementations on a deeper level. The higher the proportion of lesson time used for controlling and comparing student solutions, for public discussion of problems, or for making notices on theoretical concepts, the more students gain from those lessons. Also, high-inference ratings on teacher clarity, explication of cognitice strategies, and mediation by teachers are positively correlated with value-added test scores, while pressure for achievement as well as individualized instruction and amount of student cooperation show negative effects. Thus, deep level aspects of instructional quality seem to be operational in cognitive learning. The findings support the present authors model of three such dimensions, namely (i) structured and efficient classroom management, (ii) supportive classroom climate, and (iii) challenging cognitive activation, the third dimension being the strongest predictor of student understanding. Multi-level analyses of all 40 lessons included in the study also support the model.

Teaching activities and quality of instruction – results of a video-based study on mathematics teaching
Christine Pauli, University of Zurich, *Switzerland*
Urs Grob, University of Zurich, *Switzerland*
Kurt Reusser, University of Zurich, *Switzerland*
Barbara Drollinger-Vetter, University of Zurich, *Switzerland*
Frank Lipowsky, University of Kassel, *Germany*

The presentation deals with the interaction of instructional methods (as elements of the visible structure of the teaching and learning process) and general quality indicators, which cannot be directly determined through observable instructional features, with regard to students' learning progress. We report on a bi-national video study on mathematics instruction in Germany and Switzerland, in which 20 German and 20 Swiss teachers and over 900 students (8th/9th school year) participated. In the framework of the study, 39 videotaped instructional units on the introduction to Pythagorean theorem were analysed. Besides the videos, student surveys and tests are available to record the student conditions and cognitive outcomes. Presented are video-based analyses of the interplay of three observable key features of constructivist instruction (optimal degree of opportunities for independent exploration of problem solutions; opportunities for dealing with demanding problems in practice phases; quality of teaching discourse) with general indicators of instructional quality (cognitive activation of the students, adaptive learning support). Starting

from the assumption that all three observable features of constructivist instruction are important for learning success, we examined to what extent they were realised simultaneously in the videotaped instruction, and how this affected the students' learning and the assessment of instructional quality. For this purpose, (1) low-inferent codings measured the extent to which the three features of constructivist instruction were realised in the instructional units, with groups formed based on different feature constellations. (2) Links between the feature constellations and assessment of instructional quality through high-inferent expert ratings were examined using analyses of variance, and (3) effects on the cognitive outcomes were investigated using hierarchical linear modelling. The results indicate that a low degree of all three features negatively influences learning success, whereas a positive extent of one or more features can be assumed to have compensation or substitution effects.

B 1
28 August 2007 17:30 - 18:50
Room: 0.89 Jedlik
Paper Session

Conceptual change

Chair: **Mary Dawn Ainley,** University of Melbourne, *Australia*

Divide and Conquer: How children acquire more advanced numerical representations
Elida Laski, Carnegie Mellon University, *USA*
Robert S. Siegler, Carnegie Mellon University, *USA*

Despite the importance of understanding the relative magnitude of numbers, little is known about how this understanding develops. I will describe the results of a recent experiment that demonstrates a causal role of categorization in eliciting changes in numerical representations. The results indicated that kindergartners who were provided feedback that encouraged sorting the numbers between 0 and 100 into five equal size categories generated more linear estimates of numerical magnitude than kindergartners who were provided identical sorting instructions and practice but no feedback. Reasons for why improved categorization of numbers promotes linear representations and potential implications for instruction will be discussed.

The construction of scientific explanations and its effect on student learning
Maria Araceli Ruiz-Primo, University of Colorado at Boulder, *USA*
Min Li, University of Washington, *USA*
Shin Ping Tsai, University of Washington, *USA*

One fundamental activity in scientific inquiry is the construction of scientific explanations. It is assumed that construction of explanations helps students understand the nature of scientific knowledge in terms of its connection to evidence and its uncertainty and subjectivity to change. In this paper, we analyze the quality of students' written explanations in eight middle-school classrooms and explore the link between the quality of students' written explanations and their performance on assessments focusing on the topic studied. More specifically, we asked whether the quality of the students' written explanations found in the students' science notebooks was

related to the observed performance in a set of posttest assessments focusing on the content of the science unit studied.

Conceptual development and conceptual change in 12- and 14-year- old low SES students
Erzsébet Korom, University of Szeged, *Hungary*

This paper presents the results of a study that examined the process of knowledge reorganization which occurs as students, starting from their initial (continuous) model of matter, acquire the scientific (particle) model. The connections between the understanding of the scientific model and several variables (family background, gender, academic achievement, school related attitudes, inductive reasoning and complex problem solving) were explored. The sample comprised of two age groups: twelve-year-olds (grade 6) (N=1017) and fourteen-year-olds (grade 8) (N=947). Students from disadvantaged social environments were included only. The instrument administered assessed the knowledge and application of the particle model. Since it was used in previous data collections (studies on the understanding of the particle model in 12- to 18-year-olds), it was possible to compare present findings with those of earlier research. The results show that disadvantaged students' achievements are significantly lower than that of a more general sample. Content analyses of the students' answers show a significant presence of nañve beliefs and misconceptions in both age groups. The 6th graders' explanations did not exceed the level of everyday experiences in many cases (e.g. understanding phenomena such as evaporation, boiling, and thermal expansion). In the 8th graders' responses there appears the application of the particle model, but they frequently return to the continuous model of the structure of matter, mixing macroscopic, microscopic and symbolic levels, or inaccurately using basic scientific notions (atom, molecule, bond and state of matter). No significant differences were found by gender. There is a significant relationship between family background, academic achievement, thinking abilities and the success of conceptual change. The results highlight that knowledge acquisition and the reorganization of existing knowledge structures in the field of the structure of matter are very difficult processes. Helping these to occur in students with social disadvantage requires assiduous attention from instructors.

The role of representation in learning in science from a second generation cognitive science perspective
Vaughan Prain, Latrobe University, *Australia*

Recent accounts by second generation cognitive scientists of factors affecting cognition (Klein, 2006) imply the need to reconsider current dominant conceptual change theories of learning in science. These new accounts emphasize the role of context, feelings, embodied practices and narrative-based representation rather than decontextualized manipulation of symbols in learning science. In this paper we analyze data from a longitudinal study of children's learning across the primary school years as an empirical exploration of the usefulness of the 'second generation cognitive science' framing of learning. Our study found that this framework provides some strong theoretical and practical insights into how children learn and the key role of representational negotiation in this learning.

B 2
28 August 2007 17:30 - 18:50
Room: 2.54 Novobátzky
Paper Session

Arts education

Chair: **Emil Gaul,** Moholy-Nagy University, *Hungary*

Using graphical representations to assess children's listening competence and sense-making of simple and complex musical fragments
Lieven Verschaffel, Katholieke Universiteit Leuven, *Belgium*
Mark Reybrouck, Katholieke Universiteit Leuven, *Belgium*
Marjan Janssens, Katholieke Universiteit Leuven, *Belgium*
Wim Van Dooren, Katholieke Universiteit Leuven, *Belgium*

This paper analyzes children's spontaneous graphical representations while listening to and making sense of musical fragments. Starting from the theoretical and empirical state-of-the-art, we set up a study with a view to investigate the impact of the following four factors on the level of sophistication of children's graphical representations: (i) the children's age, (ii) their musical background, (iii) the complexity of the musical fragment to be graphically represented and (iv) the specific musical parameter being prominently present in these musical fragments. Hundred-and-sixteen children divided into four more or less equal groups (8-9 yrs olds and 11-12 yrs olds with and without extra musical education) were exposed, in the context of a whole-class test, to six musical fragments that differed in terms of complexity (three simple and self-composed fragments and three complex ones taken from existing musical compositions) and of musical parameter being prominently present in the fragment (melody, rhythm or dynamics). Children's representations were categorized by means of a classification scheme (that was developed in a previous pilot study) that distinguishes between (i) global notations, where the fragments are represented in a holistic way by one overall pictorial image (like a musical instrument or a real-world scene) and (ii) differentiated notations, which try to capture one or more musical parameters in their temporal unfolding (like an informal or formal pictorial notation of the development of the melody). As expected, we found a significant impact of age and music education: older children and children following extracurricular music education used more differentiated notations than younger children and children without such extra music education. Moreover, complex musical fragments elicited less differentiated notations than simple ones. We also found several interaction effects between the subject and task variables, – expected as well as unexpected ones. Theoretical, methodological and educational implications will be discussed.

Students' interest for history and interest supportive instruction in Swiss 9th grade classrooms
Monika Waldis, University of applied sciences Nordwestschweiz, *Switzerland*

Interest is an important objective of school education. The person-object theory (POI) of interest conceptualizes interest as a specific person-object relationship that is characterized by value-related and feeling-related valences. Krapp (2002) suggested that the emerging of feeling-related valences is closely related to the satisfaction of the three basic psychological needs identified by Deci and Ryan (2000). Feelings of competence, autonomy and social-relatedness are described to be essential to interest development. Theoretical models of interest development (Hidi & Renninger, 2006) identify situational interest as providing a basis for an emerging individual

interest. The repeated engagement with particular classes of content over time may lead to a well-developed interest. Instructional conditions should facilitate both: The emerging and maintaining of situational interest by providing meaningful and personally involving activities and the deepening of well-developed interest by providing room for interest-related activities and challenging learning tasks. Building on these theoretical frameworks, this paper aims to highlight the relationship between students historical interest and different features of history instruction in Swiss Secondary I classrooms (grade 9). Data collection for the present study included a sample of 90 history classes and their teachers from the German part of Switzerland. Data analyses show that students' general interest in historical matters is on an average. Differences between school tracks and gender could be found. The comparison of students' interest for historical themes and actual topics taught in the 9th grade classrooms reveals that boys' interest is better supported by current instruction. Students' perceptions of interest supportive teaching features are rather positive and show significant effects on students' general interest. Video analyses of interest-supportive conditions in current history lessons are under construction aiming to investigate the relationship between students' situational interest facilitated by instructional features and general historical interest.

The best and worst events in Hungarian history: An analysis of Hungarian students' views and explanations
László Kinyó, University of Szeged, *Hungary*

The aim of this study is to examine some characteristics of students' historical reasoning in different age groups, as well as the analysis of students' views and causal explanations related to events in Hungarian national history. The present paper integrates the narrative approach of social representation with several research trends on instruction targeting historical reasoning. The paper discusses (1) which events of Hungarian history are judged the most positive and negative by students; (2) students' justifications for their choices; (3) the differences in the responses and explanations which can be contributed to age, and (4) the relationship between the knowledge of collective narratives and students' responses (i.e. missing, inappropriate, appropriate responses). 414 primary school students (12-13-year-olds) and 428 secondary school students (16-17-year-olds) were included in the large scale survey. The components of the questionnaire were based on the structure of an instrument developed by László, Ehmann and Imre (2002). The questionnaire was comprised of open response items. Event categories and argument categories were established in a process of content analysis. The relationships between category variables were defined using contingency tables. The samples were compared in a homogeneity analysis. The relations between variables were explored with crosstable analyses. The results show significant differences (p

Education and expressive activity in formal and informal contexts
Gianni Nuti, University of Valle d'Aosta, *Italy*
Teresa Grange Sergi, University of Valle d'Aosta, *Italy*

This research focuses on the studies in the curriculum (Frabboni 2002, Baldacci 2005) and its role in school in the complete formation of the individual (Levine 2003, Wulf 1999, Cifali 1999). The quantitative aim of this research is to measure and delineate, using a sample of over 2000 middle-secondary school students in Valle d'Aosta (Italy), the following: how expressive arts (music, dance, theatre, figurative arts, applied arts) are cultivated in non-formal learning ambits; what is the current representation of the aforesaid at school and what measures are required in a formal reformed educational system to fill the current gaps. The quantitative analysis showed that a large number of students integrate formal learning with artistic activities with a certain continuity. A

certain quantity of students prefer to practise such activities in an informal context. Only a small number of students are not involved in any type of complementary expressive activity, external to general education. For the vast majority, school is an educational institution that is external to creativity and unresponsive to the implementation of expressive activity in the school curriculum. However, not all students thought that their expressive inclinations should have a place in the classroom as they thought it would limit their expressive freedom and it is not seen as the correct place for such activities. Those who wish for a more systematic and incisive investment on the part of educational institutions regarding knowledge and creative activity- suggest in order of importance that: q normal subjects should be integrated with those linked to artistic expression; q schools should organise public performances of the results of learning in non-formal contexts; q lastly, the curriculum should become significant, active and expressive.

B 3
28 August 2007 17:30 - 18:50
Room: -1.64
Paper Session

Mathematics education

Chair: **Tommy Dreyfus,** Tel Aviv University, *Israel*

Preservice teachers' self-representation in mathematics in relation to their recent metacognitive experiences.
Areti Panaoura, Frederick Institute of Technology, *Cyprus*

The present study aims to investigate the impact of recent and intense metacognitive experiences on preservice teachers' of pre-primary education self-representation in learning mathematics and its teaching. The first objective was to investigate whether students were aware of their cognitive processes when they were solving mathematical problems and whether they were accurate in their self-representation of strengths and weakness in mathematics in relation to their real performance. Their views of themselves are important because of their influences on the way they teach mathematics. The second objective was to investigate the influence of the recent and relative experiences on their self-efficacy beliefs about their ability to learn and teach mathematics. Data were collected from 60 preservice pre-primary teachers, attending a course for the teaching of mathematics at a Department of Pre-primary education. A questionnaire, divided into three parts, was developed measuring their self-representation in mathematics and the teaching of mathematics. The responses at the first part constituted an image of students' self-representation. The second part was consisted of a mathematical problem for which they had to evaluate its difficulty before and after solving it. At the third part they had to evaluate their ability to solve geometrical tasks and to teach geometry at pre-primary education, before and after the solution of five geometrical tasks. Results indicated that students' self- representation was not accurate, especially in the case of students with low mathematical performance. At the same time, intense or repeated metacognitive experiences influence students' self-representation and self-efficacy beliefs.

Strategy flexibility in the domain of multi-digit arithmetic: children's use of compensation and indirect addition strategies
Joke Torbeyns, K.U.Leuven, *Belgium*
Lieven Verschaffel, K.U.Leuven, *Belgium*
Pol Ghesquiere, K.U.Leuven, *Belgium*

This study aimed at analyzing the developmental changes in children's strategy flexibility in the domain of multi-digit addition and subtraction. Strategy flexibility was defined on the basis of the number characteristics of the items, i.e. as using compensation (45+19=45+20-1=65-1=64) and indirect addition (71-69=.; (69), 70, 71; so the answer is 2) strategies on those items that can be solved efficiently with the respective strategies. One-hundred-ninety-five second-, third-, and fourth-graders solved a series of two-digit additions and subtractions twice. In the first task, they were instructed to solve each item as accurately and as fast as possible with their preferred strategy. In the second task, they were asked to solve all items with at least two different strategies. Results showed that children hardly used compensation and indirect addition strategies spontaneously in the first task, and thus did not flexibly apply these strategies on the items that can be answered efficiently with compensation and indirect addition strategies. Moreover, second- and third-graders hardly reported compensation and indirect addition as an alternative strategy in the second task, indicating that they did not know (and therefore did not spontaneously use) these strategies. Fourth-graders reported compensation, but not indirect addition, as an alternative strategy in the second task, suggesting that they knew the first, but not the second, strategy. These results are interpreted in terms of the viability of different instructional approaches to enhance the acquisition of adaptive expertise.

Teaching Mathematics in classes of different levels
Ruhama Even, Weizmann Institute of Science, *Israel*
Tova Kvatinsky, Talpiot College of Education, *Israel*

This study challenges a commonly held view that teachers tend to adopt a more traditional teaching method when teaching in classes of lower achieving students. The study comprises two case studies, each of a teacher who teaches the same syllabus in two classes of different levels. Quantitative and qualitative analyses of observed teaching practices and classroom interactions in 46 lessons suggest that one teacher adopts the "transmission of knowledge" approach in both her classes, emphasizing basic skills and rote learning; whereas the other teacher emphasizes more thinking, understanding and problem solving. Surprisingly, both teaching profiles were enhanced in the lower level class of each teacher. The findings suggest that in her own way, each teacher aimed to help more the students who encountered more difficulties – the lower achieving students – and she did it by using the resources available to her. Theoretical and practical implications will be discussed.

Investigating student learning gains using the Teaching Mathematics Observation Schedule (ToMOS)
Sarah Hopkins, University of Western Australia, *Australia*
Hilary Hollingsworth, Education Consultant, *Australia*
William Louden, University of Western Australia, *Australia*

This paper presents the findings from the first phase of a large scale investigation of student learning gains and the effective teaching of mathematics. Numeracy achievement scores were collected for 2864 students (132 classrooms) at the end of Year 7 and Year 8. These scores were

analyzed using a multilevel technique to identify effective teachers based on learning gain estimates. The ToMOS, a newly developed observation schedule, was then used to record the occurrence of specific teacher actions relating to (i) promoting conceptual understanding and (ii) communicating expectations. Observations were made of teachers identified as being effective. Preliminary findings indicate that the actions specified on the schedule distinguish between different levels of effective teaching. Further refinement of the ToMOS is being undertaken to provide a valid reflective instrument for mathematics teachers wanting to improve their effectiveness in the classroom.

B 4
28 August 2007 17:30 - 18:50
Room: -1.62
Paper Session

Science education

Chair: **Philip Adey,** Kings College London, *United Kingdom*

Students' understanding of the taxonomic implications of nominal groups construed in photosynthesis science text
Ting-lun Lai, Grad. Institute of Science Ed., National Taiwan U., *Taiwan*
Wen-Gin Yang, Grad. Institute of Science Ed., National Taiwan U., *Taiwan*

This study aimed to investigate taxonomic organizations implied in nominal groups on science textbooks and student's perception and understanding about these taxonomic organizations. Subjects were students in two learning stages, and a total of 133 students from junior high schools and universities were involved. The experimental text was based on the photosynthesis unit in Hanlin's textbook for junior high school students. According to the text, a 2-tier "A Reading Comprehension Test of the Photosynthesis Unit" was designed and answered by the subjects after reading. The result findings showed that both junior high school and university students had an incomplete perception of taxonomic organizations implied in nominal groups, and junior high school students presented a serious deficiency. In addition, when taxonomic organizations implied in nominal groups were not consistent with those commonly agreed among scientific communities, a proportion of students would deduce a set of inexistent taxonomic organizations under the grammatical hints of nominal groups. This proportion was higher among undergraduates than among junior high school students. Thus, the use of nominal groups in textbooks requires the consideration of learning stages and the functions of specific modifiers, so that correct taxonomic organizations can be presented to induce correct perceptions from students.

The effect of pre-test sensitizing in a digital system on the acquisition of science concepts
Floor Bos, University of Twente, *Netherlands*
Cees Terlouw, University of Twente, *Netherlands*
Albert Pilot, University Utrecht, *Netherlands*

Effective instruction for science concept learning looks to be necessary, because of the decreasing face-to face availability of science teachers, and the relative high student-teacher ratio in secondary education. The use of ICT looks a promising approach to solve this problem. From the

perspective of schema theory, and taking into account the state of the art of research on prior knowledge assessment, an effective approach could be to activate relevant prior conceptual networks with a pre-test that is embedded in an instructional design in an interactive digital system by which all relevant instructional functions could be realized. In an experimental instructional design the effect of pre-test sensitizing embedded in an interactive digital system on learning of science concepts is investigated. The content of the experimental instruction concerns besides a digitalized pre-test, a digitalized orientation on science concepts in the joint area of physics, chemistry, biology, applied mathematics, and computer sciences of which concepts were made operational. The effects of the experimental instructional design were investigated by applying an extended Solomon Four Group design in which making science concepts operational or not was combined with a pre-test or not; the pre-test consisted of short-answer questions and multiple-choice questions. The results showed high learning gains, especially after applying a pre-test; however, also without a pre-test good learning gains were found. The two questions types did not differ significantly in learning gain. Applying a pre-test without making the science concepts operational had no significant effect.

Using multi-modal representations to improve learning in science
Bruce Waldrip, University of Southern Queensland, *Australia*
Vaughan Prain, La Trobe University, *Australia*
James Carolan, La Trobe University, *Australia*

There is growing recognition that learning science in school entails understanding and linking verbal, visual and mathematical modes to develop knowledge of scientific concepts and processes. However, students face considerable challenges in using these literacies of science as they interpret and construct scientific texts. Our paper reports on two case studies on the topics of the particle theory of matter in Year 7, and force in Year 8. We aimed to identify (a) students' understandings of, and capacity to link, different representational modes to develop conceptual knowledge, and (b) teachers' perceptions of, and strategies to support, learning through this interlocking modal focus. Analysed qualitative data included work samples, and focus-group interviews, as well as observations and interviews with participant teachers. The findings indicated that this multi-modal focus posed significant demands on learners, but had the potential to enable effective learning.

Influence of hands-on activities on interest
Nina Holstermann, Didactics of Biology, *Germany*
Dietmar Grube, Educational and Developmental Psychology, *Germany*
Susanne Bogeholz, Didactics of Biology, *Germany*

This paper investigates the influence of typical biological hands-on activities on students' interest. Findings refer to the activities of experimenting (a), dissecting (b), working with microscopes (c) and classifying flowers (d). Hands-on experience is a situational factor which is assumed to catch students' interest (cf. Bergin, 1999). If activities are experienced as emotionally positive, they can lead to increased interest (Todt, 1995). Hidi and Renninger (2006) emphasize the importance of positive feelings in early phases of interest development. Our hypotheses are: i) Students with experience in specific hands-on activities have more actual interest in that activity than students without such experience. ii) The more positive the hands-on activities are perceived the higher is the actual interest. The sample of this cross-sectional study consists of 141 students, who attended the 11th class of grammar school. 14 classes, that consist of 16 to 18 years old students, were surveyed. Students were asked in a self-report questionnaire whether they are interested in specific

activities, whether they have conducted those activities before and if so, how they have perceived the experiences emotionally. Since hands-on activities can influence students' interests positively as well as negatively our first hypothesis can be only partly confirmed. The second hypothesis seems to be supported by our findings. The emotional experience of an activity appears to be an influential factor for interest development (cf. Todt, 1995; Hidi & Renninger, 2006). Our conclusion for the educational field is that since hands-on activities offer a potential to influence students' interests positively they should be used by teachers more often. As emotions play an important role in interest development teachers should meet the challenge to create biology lessons which allow experiences with hands-on activities and attract students emotionally.

B 5
28 August 2007 17:30 - 18:50
Room: 7.14
Paper Session

Cognitive skills

Chair: **Erik De Corte,** University of Leuven, *Belgium*

A critical literature review of the Motivated Strategies for Learning Questionnaire (MSLQ)
Mark Earley, Bowling Green State University, *USA*
Richard Wisneski, Bowling Green State University, *USA*
Daniel Fasko, Bowling Green State University, *USA*

We conducted a critical literature review on empirical studies from 1995 to 2006 of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991), which expands on the Duncan and McKeachie (2005) review of research from 2000 to 2004. The next stage of our research will be a meta-analysis of the MSLQ. The MSLQ is based upon constructivist and social cognitive theory, and was designed to assess college students' motivational orientations and their use of different learning strategies, which could predict course performance. It has been used with junior high school to college students, and it has been used in different countries, across different content areas, and with different populations (Duncan & McKeachie, 2005). Our criteria for inclusion of studies were that: (1) the entire MSLQ was administered, (2) only undergraduate populations were included, and (3) that the English version had to be administered; this reduced the number of studies included. We focused on the assessment/prediction of academic achievement. Briefly, Lynch (2006) found that self-efficacy and effort regulation predicted course grades for upper level students, and that self-efficacy and extrinsic goal orientation predicted course grades for freshmen. McClendon (1996) reported that the MSLQ (Pintrich, McKeachie, Smith, Doljanac, Lin, Naveh-Benjamin, Crooks, & Krabenic, 1988) accounted for approximately 18% of the variance in predicting course grades for pre-service teachers, where the best predictor was task value interest. Watson, McSorley, Foxcroft and Watson (2004) found that the motivation subscales of the MSLQ except for control of learning beliefs, and test anxiety were significantly related to academic performance, and that the learning strategies scales except for organization, peer learning and help-seeking were significantly related to academic performance. Thus, it appears that the MSLQ can predict college course performance.

The development of elementary math: Results form a large scale longitudinal study
Krisztián Józsa, University of Szeged, *Hungary*
Rita Kelemen, University of Szeged, *Hungary*

A number of studies have examined mathematical skills in kindertgarten- and school-age children. However, the literature does not seem to be rich in large-scale longitudinal studies, although it is these that uncover individual developmental processes and the factors influencing this development. The paper presents the results of a longitudinal study on the development of elementary arithmetic. The sample (N=5000) is representative for Hungary regarding the students' gender, the parents' education, territorial distribution and settlement type. At the time of the pre-test, October 2003, the subjects attended grade 1. The instrument was an elementary arithmetic test, administered in individual sittings. It consisted of 58 items, its reliability was .925. This test is part of the DIFER programme package, a standardised Hungarian diagnostic assessment battery. At the time of the post-test, May 2005, the children attended grade 2. A paper and pencil test was administered, which was developed in accordance with the Hungarian National Curriculum and the American Principles and Standards for School Mathematics. It consisted of 95 items and its reliability was .915. There are huge differences in the development of arithmetic skills even at the beginning of schooling. There is a moderate correlation (r=.47) between the pre- and the post-test. The data makes it clear that the school cannot compensate for the disadvantages of children starting school with less developed arithmetic skills: the vast initial differences remained unchanged in the intervening 18 months. The mother's education correlated at r=.44 with the pre-test and at r=.35 with post-test. A regression analysis showed that the pre-test and the mother's education together explain 25% of the variance of the 2nd graders' developmental level in arithmetic. The data also calls attention to the significant role of the family background and to the highly selective nature of the Hungarian school system.

Working memory contributions to young children's oral comprehension of text: Merely mediated by vocabulary comprehension?
Elisavet Chrysochoou, Aristotle University of Thessaloniki, *Greece*
Zoe Bablekou, Aristotle Univerity of Thessaloniki, *Greece*

Our aim was to study whether the contributions of working memory (WM) to the oral comprehension of text in childhood are direct or merely mediated by vocabulary comprehension. Our research was conducted in the frame of Baddeley and Hitch's (1974; Baddeley, 1986) WM model. With regard to language comprehension, the phonological loop of the model (PL) is thought to maintain a phonological record that can be consulted during off-line processing. The central executive (CE) of the model is assumed to be involved in the syntactic and semantic processing, in storing the products, in retrieving relevant information from long-term memory and in coordinating activities within WM. Both components could accordingly contribute either to the comprehension of text words that are unknown to children or to the retrieval, from the lexicon, of word meanings that are not accessed automatically yet. However, relevant studies are limited and have not taken vocabulary comprehension into account. In the present study, we assessed 180 children, divided into three groups (C.A. 5:7, 7:7 and 9:7, respectively), using PL and CE tasks, a vocabulary task, as well as texts with accompanying comprehension questions. The results of hierarchical regression analyses showed that the contribution of the CE measures was not merely mediated by vocabulary comprehension; it was also direct, in contrast to the PL measures. In line with its role in text comprehension, the CE seems to also support higher-level processes involved in text comprehension (e.g. inference making, simile comprehension, or comprehension control). Future research is proposed with regard to both oral and reading comprehension of text.

Effects of age and schooling on the development of intellectual performance: Estimates obtained from analysis of continuous variation in age and length of schooling
Christina Cliffordson, University of Gothenburg, *Sweden*

In the study, the relative effects of age and schooling on intellectual performance, taking tracks of study into account, is examined. The analyses were based on military enlistment test scores obtained by 48 269 males. The battery contains four tests (Instructions, Synonyms, Metal folding and Technical Comprehension), and measure Fluid ability (Gf), Crystallized intelligence (Gc), and General visualization (Gv) ability. A regression method, relying on simultaneous variation in age and length of schooling at the time of the testing that allows separation of the relative amount of influence of age and schooling, was used. In the models, test scores constitute the dependent variable and age and length of schooling, measured in days, constitute the independent variables. The results indicate that both age and schooling increase intellectual performance, even if the schooling effects generally are considerably stronger. The trucks with technical and natural science orientation caused the generally strongest total improvements. The schooling effects are, however, between two- and fivefold as strong as the effects of age. The strongest effects are shown for the Synonyms and Technical comprehension tests, which constitute the poorest measures of Gf, but are also measures of Gc and Gv, respectively.

B 6
28 August 2007 17:30 - 18:50
Room: 1.71 Pócza
Paper Session

Motivational, social and affective processes

Chair: **Marcel Crahay,** Universite de Geneve, *Switzerland*

Multiple goals : an investigation of developmental trends and learning outcomes in a Hong Kong educational context
David Watkins, University of Hong Kong, *Hong Kong*

This paper reports a study of multiple motivational goals and their relationship to learning strategies, self-attributes, and achievement. It extends previous research by being a longitudinal study in a non-Western setting and by considering social goals as well as mastery and performance goals as possible multiple goals. The participants were 697 Hong Kong secondary school children. Measures were obtained at two times points twelve months apart of their academic goals and learning strategies. Their academic achievement was also obtained. A median split was used to assign each participant to one of eight motivational groups: 2 (high - low) x 3 goal types. Multivariate analysis showed that for achievement there were no significant main or interaction effects. For learning outcomes a Time main effect was found for achieving strategy only but significant differences were for the Motivation group main effects but not for the interactions (note the latter would be evidence of multiple goals). For the self-attributes again only significant main effects were found. The findings did not support traditional multiple goal theory let alone its extension to include social goals or the particular benefits of a strong mastery goal orientation in terms of associated deeper learning strategies or more positive self-attributes. Rather it seems that

in the Hong Kong context, the more ways a student can be motivated the more likely they will be using better learning strategies and to have more positive self perceptions.

Understanding personal and contextual factors generating adaptive academic motivation in college: An interview study
Bodil Stokke Olaussen, University of Oslo, *Norway*

While there often seems to be a general decline in adaptive motivation over the college years, some students display growth trajectories that, in fact, counter this negative trend. The current research provides an in-depth examination of personal and contextual factors that may generate positive motivational development for individual students. The participants were 22 Norwegian business administration students who had previously participated in longitudinal cluster-analytic research, indicating that these students had either maintained or developed high levels of adaptive academic motivation (in terms of personal interest, mastery goals, task value, and self-efficacy) over a period of two academic years. In this study, we followed-up on the longitudinal cluster-analytic research by using interviewing methodology to have the participants themselves describe and explain their motivational development during the same period of time. The findings indicated that these students had clear overall goals for their education, combining a wish to learn with ambitions to receive good grades and be able to compete for the best jobs. Moreover, these students reportedly regulated not only their academic motivation, but also their cognition, behaviour, and study context, with this being in line with several recent theoretical accounts of self-regulated learning. This effort to understand personal and contextual factors that generate positive motivational growth trajectories for individuals may have important implications for instructional design, helping us create motivationally optimal learning environments for more students in postsecondary education.

Are changes in students' perceptions of the learning environment related to changes in emotional and behavioural problems?
Elin Thuen, Univeristy of Stavanger, *Norway*
Edvin Bru, University of Stavanger, *Norway*

Previous survey based research suggests that students' perceptions of the learning environment are associated with emotional and behavioural problems (EBP). However, it is not clear to what extent the associations identified are merely reflections of individual student characteristics. The present study explored this issue by utilizing a one group pretest-posttest design to minimize the influence of individual characteristics on associations of perceived learning environment with EBP. Moreover, by connecting the study to a planned restructuring of the learning environment occurring in a Norwegian secondary school, it was also explored how changes in the learning environment were related to changes in EBP. Results suggest that associations between learning environment factors and EBP are not merely reflections of individual characteristics. Change in off-task-orientation was significantly associated with changes in all learning environment factors, strongest with meaningfulness of schoolwork, teachers' emotional support and adaptation of schoolwork. Changes in teachers' monitoring, emotional and academic support were the strongest predictors of change in externalising problems. These factors were also significantly associated with change in emotional problems, together with changes in student influence and meaningfulness of schoolwork. We also explored if individual coping styles would predict changes in emotional and behavioural problems following the restructuring of the learning environment. Results did not support this.

Self processes of school friendship and acquaintance groups: A mixed methods approach.
Jose Hanham, The University of New South Wales, *Australia*
John McCormick, The University of New South Wales, *Australia*

The purpose of this study was to explore the phenomenon of school-based group work with groups comprising either close friends or acquaintances. In particular, we investigated how key self-processes, namely self-efficacy beliefs and self-construal, were related to group behaviour and group performance. A novel theoretical framework was developed based on research into group work in educational, broader organisational, and cross-cultural contexts. This theoretical framework was tested using a mixed-methods approach that included survey and observational data. The sample comprised Grades 10 and 11 students from two randomly selected government secondary schools in Sydney, Australia. The study had two phases. In phase one, a survey was administered to measure self processes. In addition, sociometric mapping was used to form six friendship and seven acquaintance groups. In phase two, each group was videotaped performing a group problem-solving activity. The achievement of each group was scored by an independent expert without knowledge of the composition of each group. Videotapes were analysed by two researchers with respect to individual and group behaviours. Data trends suggested that irrespective of whether the groups were composed of friends or acquaintances, the extent to which individual group members reported an interdependent view of self, was related to higher group performance scores. From a theoretical perspective, the examination of the link between self-processes and group performance marks a significant step in unravelling some complexities of school-based group work. Whilst some studies in organisational settings have examined the influence of self-processes on work group behaviour, educational researchers have yet to fully incorporate self-construal and self-efficacy for group work into studies of school-based group work. In terms of classroom practice, one important recommendation is that before using group work, teachers should consider nurturing student interdependence.

B 7
28 August 2007 17:30 - 18:50
Room: 0.81 Ortvay
Paper Session

Motivation

Chair: **Sanna Järvelä,** University of Oulu, *Finland*

Enhancing motivation and self-regulated learning by applying a computer based training approach
Markus Dresel, University of Ulm, *Germany*
Marion Haugwitz, University of Ulm, *Germany*

A computer based approach was designed in order to enhance motivation and self-regulated learning. Participants of the quasi-experimental study were N=160 6th grade students who worked with a mathematics learning software over the period of six month. In the first condition students received attributional feedback generated by the software. In the second condition students received the attribution feedback and an additional self-regulation training which was designed to foster metacognitive control strategies. In a control condition, students received neither of the two.

We observed positive effects on motivation and knowledge acquisition within both training groups. As expected, an enhancement of the control strategies was only evident in the self-regulation condition. Moreover, the additional self-regulation training led to better knowledge acquisition than the exclusive motivational training.

Conceptual and empirical dimensions of students' evaluation-related goals
Marina Serra de Lemos, University of Porto, *Portugal*
Telma Leite, University of Porto, *Portugal*
Claudia Lopes, University of Porto, *Portugal*

To clarify the current debate within achievement goal theory concerning performance goals, we suggest that there is more to students' evaluation-related goals than the concept of performance goals comprises. Goal theory identified three dimensions of performance goals: approach-avoidant, competition, and appearance concerns (Elliot & Harackiewicz, 1996; Grant & Dweck, 2003). However, whereas evaluation-related goals may include strong goal statements stressing competition and/or appearance, they mainly consist of weaker goal statements such as receiving positive evaluations or avoiding negative ones (Lemos, 1996). Moreover, research has questioned the very relevance of performance goals (Brophy, 2005; Lemos, 1996; Urdan, 2001). This study defined three main aims: to establish (1) the distinctiveness and (2) the relevance of competitive and appearance concerns (performance goals) within students' overall evaluation-related goals, and (3) whether approach and avoidant goals are empirically distinct. A pool of evaluation-related goals was formed combining three dimensions: approach-avoidance, appearance (present-absent), and competition (present-absent). From the eight resulting combinations, 2 refer to goals with appearance and competitive purposes, 2 to only appearance purposes, 2 to only competitive purposes, and 2 to evaluation goals (without reference to appearance or competition). 120, fifth and sixth grade students from two city schools in the North of Portugal, answered the evaluation-related goals items (9 point Likert scale); two weeks later they also completed the personal goals scales of the PALS (Midgley et al, 2000). Principal component analysis confirmed that performance goals involving competition and/or appearance only partially cover the conceptual and empirical field of students' evaluation-related goals. Moreover, the analysis of goal priorities revealed that students focus mainly on getting positive evaluations and avoiding poor ones, and only to a smaller extent on competition.

Balancing cocial and academic goals at high school
Michael Townsend, Massey University, *New Zealand*
Mei Lai, University of Auckland, *New Zealand*

Balancing Social and Academic Goals at High School Recent research has focused on the interplay between social goals and academic goals, often perceived by students and teachers to be in conflict. Using Dodge et al's (1989) theoretical account of strategies to coordinate multiple goals, this study examined how high school students deal with a typical situation in which an academic goal (completing an assignment for credit) is in potential conflict with a social goal (attending a best friend's birthday party). In four iterations of the situation, the goals were systematically varied in urgency. Using ratings of the likelihood of using particular strategies, and interviews with students, it was found that although students valued both academic and social goals, their preference was to maximise the social goal. If the academic goal was not urgent, students favoured a strategy deferring the academic goal in favour of the social goal. If the academic goal was urgent, students favoured a single integrative strategy in which both goals were similarly favoured without modification of either goal. The results are discussed in terms of the

dual need to modify instructional pedagogy to accommodate both social and academic goals, and to teach specific strategies to students to facilitate the coordination of multiple goals.

Autonomous-supportive versus controlling contexts in elementary physical education classrooms: The effect of teaching practices and grade level on students' interest, subjective vitality, and exerted effort
Athanasios Mouratidis, University of Leuven, *Belgium*
Thodoros Ageriadis, University of Crete, *Greece*
Georgios Michailidis, University of Crete, *Greece*

The purpose of this study was to investigate the effect of autonomous-supportive versus controlling contexts on students' variability of affect and motivation-related outcomes in a sample of elementary school students. Also, it aimed to examine within-students' variability and between-students' differences of these outcomes as a function of gender and grade level. Participants were 138 fifth and sixth-grade elementary students, from 11 intact physical education (PE) classrooms, and their PE teachers. The 3 PE teachers, blind to the aims of the study, modified their teaching practices and the subject matter accordingly, so as to deliver 3 autonomous-supportive, and "enjoyable" PE class hours, and 3 more controlling, "formally structured", PE class hours. At the end of each class session, students reported their feelings of interest and enjoyment, subjective vitality, perceived exerted effort, and perceived pressure and tension. Multilevel analyses (HLM) have shown that compared to the controlling instructional climate, students under the autonomous-supportive condition reported, on average, significantly more interest and enjoyment, more subjective vitality, and more effort expenditure than under the more controlling condition. Compared to sixth graders, fifth graders reported significantly more enjoyment, subjective vitality, and effort expenditure. No significant context or grade effects were found for perceived pressure and tension. Also, apart from the context effects, no significant grade effects were found for the within-students' variability on the dependent measures. Finally, there were no gender differences for any of the dependent measures. Results are discussed within the self-determination theory.

B 8
28 August 2007 17:30 - 18:50
Room: 4.95
Paper Session

Parental involvement in learning

Chair: **Jos Beishuizen,** Vrije Universiteit Amsterdam, *Netherlands*

Enhancing learning potential of children with special needs through parent-teacher collaboration: A Participatory Action Research study
Juliet Choo, AWWA, *Singapore*
Peter Renshaw, University of Queensland, *Australia*

This paper examines the practice and outcome of a participatory action research (PAR) project that involved parents and teachers collaborating to improve the learning potential of children with special needs. Participatory action research was specifically chosen as the way to improve the education of these special children because it offers a framework that narrows the gap between

research and practice. Participants become partners in the research process by assisting in the design and conduct of the research process. Those parents and teachers who agreed to be involved in the second stage of the study were asked to identify a common vision for the child, brainstorm a range of strategies, design an action plan and carry out strategies of their choices. This paper presents two case studies: one involved a nine-year-old Chinese-Australian boy with Down syndrome, Audi, whose parent and teachers chose reading as a common goal to work towards. The other case study involved a six-year-old Vietnamese-Australian girl with autism spectrum disorder, Jessica, whose teachers focused on the goal of self-management in the regular classroom. Results showed that the children improved in their respective areas, and that the frequency of parent-teacher communication increased. Also, literacy improvements were noted among Audi's classmates, and Jennifer's class teacher came to identify Jennifer as her pupil, rather than as a visitor to her class. Despite these successes, the PAR approach poses a number of challenges. There was reluctance on the part of some parents and teachers to devote the time required for joint planning and review. Also at times, the partners disagreed and were unable to quickly resolve differences in developing and carrying out their joint plan. The strategies deployed by the facilitator / researcher in mediating these differences are highlighted in the presentation.

The influence of parental behavior on students' emotions and achievement: Two field studies in german secondary school
Stefan Fuss, University of Education Ludwigsburg, *Germany*

The role of parental behavior for students' learning at school is widely discussed in the last years. Emotional and social support of the child is measured in this study by a latent variable named 'authoritative promotion of learning' (e.g. offering help, emotional support). In contrast to the authoritative style of parental behavior a further latent variable was measured to take into consideration the authoritarian style of school-related parental behavior, named 'authoritarian control of achievement' (e.g. punishment, pressure to perform). Both studies ®– the original study and the replicated study – investigate the influence of perceived school-related parental behavior ('authoritative promotion of learning' vs. 'authoritarian control of achievement') on positive and negative emotions and on achievement of 8th grade students in German secondary school in the subjects Physics and German Language (n>315). The general hypotheses were, authoritative behavior leads to positive emotions and better achievement, whereas authoritarian behavior leads to anxiety and consequently to worse achievement. The hypotheses were tested by a linear structural equation model (LISREL), in which the domain-specific marks of grade 7 (sciences, language) were used as additional exogenous variables to set all estimations in the model independent from prior achievement. The results were the following: 'authoritative promotion of learning' affects positive emotions in a positive way, but the linear effects on achievement were very small or not significant. 'Authoritarian control of achievement' affects more or less 'anxiety' as expected, but there were no negative effects on achievement. The best predictors for achievement in grade 8 were the domain-specific marks of grade 7.

Parents' general and math-specific beliefs of children's competence: their relations to children's achievement strategies, task-value and skills
Katrin Magi, University of Jyväskylä, *Finland*
Marja-Kristiina Lerkkanen, University of Jyväskylä, *Finland*
Anna-Maija Poikkeus, University of Jyväskylä, *Finland*
Helena Rasku-Puttonen, University of Jyväskylä, *Finland*

The aim of the present study was to explore the relations between parental beliefs of their preschool-aged children's general and math-specific competence and children's self-reported achievement strategies and task-value. The relations between these constructs and children's cognitive and math-related skills were also investigated. The participants were 98 five- to six-years-old children from 13 preschool classes, their mothers and fathers. Both, mothers and fathers were asked to fill in a questionnaire regarding their child's general preschool-related as well as math-specific competence. Children were individually interviewed regarding their achievement strategies and math-specific task-value. In addition, children's cognitive and math-related skills were measured. Structural equation modelling with latent variables was used to explore the relations between parental beliefs, children's achievement strategies and math-specific task value and to what extent these constructs predict children's cognitive and math-related skills. The results indicate that parents' math-specific rather than general beliefs predict children's cognitive and math-related skills whereas parents' general rather than math-specific beliefs are related to preschool-aged children's self-reported achievement strategies and math-related task-value. Fathers' beliefs seem to be related to children's adaptive achievement strategies whereas mothers' beliefs seem to have stronger relations with children's less adaptive achievement strategies like competing and avoidant strategies. These findings might have important practical implications for teachers and other professionals communicating with parents concerning their child's developmental and educational outcomes. Preschool-aged children's self-reported achievement strategies seem to predict children's general cognitive skills rather than more achievement related math skills. However, already preschool-aged children's math-specific task-value strongly predicts their math-related skills, indicating that math related beliefs and attitudes may start to form long before children start formal school education.

B 9
28 August 2007 17:30 - 18:50
Room: Konferencia
Paper Session

Special education

Chair: **Éva Molnár,** University of Szeged, *Hungary*

Teachers' attitudes toward inclusion according to the disability's category and graveness, and their perception of skills needed for coping with students with disabilities in the inclusive classroom
Eytan Cohen, "Ohalo" College, *Israel*
Yona Leyser, Northern Illinois University, *USA*

The study examined attitudes of teachers toward the inclusion of students with different types of disabilities; perceptions of their competencies for teaching these students and general inclusion skills. Also examined were factors influencing perceptions, and teacher training needs. Participants were 270 teachers in two school districts, who responded to a modified scale adapted previously from English by Lifshitz and Naor (2001). Findings revealed a hierarchy of preference for placement in inclusive classrooms; Acceptance of students with mild disabilities, and rejection of students who are blind, deaf, and those with moderate and severe mental retardation and emotional and behavioral disorders. Perceptions of teaching skills were correlated with these attitudes toward

integration. Inclusion skills ranked high were team work and interpersonal interaction skills. Ranked low were skills for curricular and material adaptation and behavior management skills. Teachers expressed a need for training in areas as: principles of inclusion, identification and assessment, and characteristics of students with low incidence disabilities. Experience, training, and certification type were related to teacher attitudes and to their perceptions. Implications for teacher education are discussed.

Using deaf children's visual skills to promote mathematics learning: An early intervention project
Peter Bryant, Oxford Brookes University, *United Kingdom*
Terezinha Nunes, Oxford University, *United Kingdom*
Diana Burman, Oxford University, *United Kingdom*
Daniel Bell, Oxford University, *United Kingdom*
Deborah Evans, Oxford University, *United Kingdom*
Darcy Hallett, Oxford University, *United Kingdom*

Deaf students leave school with a level of mathematical competence that seriously interferes with their future prospects. As there is no evidence for an inbuilt difficulty with mathematics among deaf people (Zarfaty et al, 2004; Bull et al, 2006), the potential for early identification of difficulties and intervention is considerable. An important longitudinal predictor of mathematics learning, shown to be independent of intelligence (Stern, 2006; Nunes et al, 2006), is the understanding of the inverse relation between addition and subtraction – or "inversion". Measures of children's understanding of inversion assess whether they realise that a+b–b=a. We investigated deaf children's understanding of inversion in two studies. In Study 1, 19 deaf children were compared to 98 hearing children in their first year of school. Deaf children were significantly behind their hearing peers in inversion. In Study 2, we developed and assessed an intervention to promote deaf children's understanding of inversion. Participants (N=18) were randomly assigned to an intervention group or a control group. Both groups participated in a pre-test, an immediate post-test and a delayed post-test, which contained inversion tasks and control items (assessing computation skills). They also participated in two individual sessions with a researcher, where they received teaching on a number-related concept: the intervention group's teaching was about inversion and the control groups' about a different concept. We expected the intervention group to improve significantly more on the inversion tasks but not on the control items. The intervention group's performance on inversion improved significantly across assessments; the control group's did not. The difference in improvement between the groups was significant for the inversion but not for the control items. This study illustrates how early diagnosis and effective educational interventions could improve deaf children's mathematics learning.

Deaf students' use of morphology in reading and writing
Terezinha Nunes, University of Oxford, *United Kingdom*
Diana Burman, University of Oxford, *United Kingdom*
Deborah Evans, University of Oxford, *United Kingdom*
Daniel Bell, University of Oxford, *United Kingdom*
Adelina Gardner, University of Oxford, *United Kingdom*
Darcy Hallett, University of Oxford, Department of Educational St, *United Kingdom*

Learning English literacy is a great challenge for congenitally, profoundly deaf students, who do not have the range of experiences with sounds necessary for using letter-sound correspondences accurately. However, written English represents through letters not only sounds but also morphemes, which are basic units of meaning: for example, the word "magician", which seems

irregular from a letter-sound correspondence analysis, is regular if analysed into its morphemes, "magic" and "ian". If deaf students can learn to use morphemes in analysing written words, they could make further progress in literacy learning. Morphemes and grammar are strongly interconnected: for this reason, students might also improve their reading comprehension and writing from learning about morphemes. We developed and assessed a teaching programme for deaf primary school students aimed at improving their awareness of grammar and morphology in written English. A total of 112 deaf students (aged 7 to 12 years) participated in this study. A baseline of students' performance was collected in one year; an intervention was implemented in the subsequent year and its results analysed by comparison with the baseline. The teaching programme contained IT supported exercises to promote awareness of morphemes, games to offer the students extra practice with morphemes, and especially designed story books, which exposed the students to the words in context and created the opportunity for further exercises. These materials can be downloaded from http://www.edstud.ox.ac.uk/research/childlearning/index.html The students were pre- and post-tested in the use of suffixes in spelling, reading comprehension and writing. Post-test results, controlling for age, hearing loss, IQ and pre-test scores, showed that the students who had participated in the programme significantly outperformed the comparison group in all three measures. The programme was described by a deaf teacher as "not a magic key but certainly another brick on the wall".

Effects of the inclusion of children with Special Educational Needs in Dutch mainstream education
Evelyn Kroesbergen, Utrecht University/Langeveld Institute, *Netherlands*
Linda Sontag, Tilburg University/IVA, *Netherlands*
Roel van Steensel, Tilburg University/IVA, *Netherlands*
Paul Leseman, Utrecht University/Langeveld Institute, *Netherlands*
Sanne van der Ven, Utrecht University/Langeveld Institute, *Netherlands*

Various studies have investigated the effects of inclusion on the cognitive and socio-emotional abilities of children with Special Educational Needs (SEN). Some researchers observed positive or "neutral" outcomes (Waldron & McLeskey, 1998; Banerji & Daily, 1995), while others found indications for negative effects (Vaugh et al., 1996). This paper presents the results of a study into the relationship between the full inclusion of SEN children with various types of disabilities into Dutch mainstream education and their cognitive and socio-emotional development, as well as the relationship between (potential) beneficial effects and school environment variables. In the study SEN pupils in mainstream classes (n=76) were compared to their normally achieving classmates (n=333) and to a group of comparable SEN children in special education classes (n=52). Various effect measures – standardized school tests, psycho-social measures and teacher report forms – were used to assess children's development in the course of one school year. Statistical analyses revealed neutral and – in one case – positive effects on cognitive development, although SEN children still lagged behind their normally achieving classmates. Analyses further indicated a negative effect on socio-emotional development, i.c. self-perception of academic competence, probably due to social comparison with normally achieving classmates (Festinger, 1954). These findings do not support the ideal of full inclusion for all SEN children. Instead, it is recommended that children need the presence of other SEN children, e.g. through participation in semi-inclusive settings ("pull-out classes").

B 10
28 August 2007 17:30 - 18:50
Room: 0.83 Eötvös
Paper Session

At-risk students

Chair: **Sangeeta Bagga-Gupta,** University of Örebro, *Sweden*

Learning disabilities in math in Grade 5 and Grade 8: An empirical study
Elisabeth Moser Opitz , Pädagogische Hochschule Bern, *Switzerland*

A research project (2001-2004) examined more precisely the below average performance in mathematics by pupils in grades 5 and 8 with average and below average IQ, as well as the mathematical competencies of a comparison group (N total = 266). The results indicate that pupils (both genders) weak in mathematics did not acquire – or only partially acquired – specific aspects of the subject matter in the first four years of school (called "basic subject matters"). No significant differences were found between pupils with below average IQ and average IQ. Regression analysis showed that the current mathematical performance is predicted by the knowledge of the basic subject matters (especially decimal system, counting in tens or twos, understanding of multiplication, division and completion). These findings lead to important implications for diagnostics and instruction.

The influence of working memory and early numeracy on arithmetic performance in children with cerebral palsy.
Kathleen Jenks, Radboud University, *Netherlands*
Ernest C.D.M. van Lieshout, Vrije Universiteit, *Netherlands*
Jan de Moor, Radboud University, *Netherlands*

The development of addition and subtraction skill was assessed in first graders with cerebral palsy (CP) in both mainstream (16) and special education (41) and a control group of unimpaired first graders in mainstream education (16). Both CP groups showed evidence of working memory deficits. The three groups exhibited different developmental patterns in the area of early numeracy skills: all three groups differed in the beginning of first grade and only the CP-mainstream group caught up to the control group by the end of first grade. Children with CP in special education were found to receive less arithmetic instruction and instruction time was in turn positively related to arithmetic accuracy. The control group out-performed the CP mainstream education group, who, in turn, out-performed the CP special education group in addition and subtraction accuracy, but only the differences between the CP special education group and the other two groups achieved statistical significance. An ANCOVA revealed that all observed group differences in addition and subtraction accuracy could be completely explained by a combination of working memory and early numeracy. The development of arithmetic accuracy throughout first grade was seen as a chronological process. Presumably as a result of the neurological damage that occurs in or before the first year of life, CP was shown to lead to deficits in the visual-spatial sketchpad, phonological loop and central executive of working memory. Working memory, in turn, explained a portion of the observed group differences in the early numeracy skills that develop in the pre-school years. The combined effects of working memory, and early numeracy were sufficient to completely explain the observed group differences on addition and subtraction accuracy.

Naming speed and the development of reading ability
John Kirby, Queen's University, *Canada*

Many children struggle to learn to read, especially in English, and so it is important to understand the factors that underlie success and failure. Naming speed (or Rapid Automatised Naming, RAN) has been proposed as one of the major predictors of reading development, in English and other languages (Wolf & Bowers, 1999). Naming speed is the speed with which individuals name sets of stimuli, such as colours, objects, letters, and digits. This paper will review the current evidence concerning the role of naming speed in learning to read, and present the results of a longitudinal study of reading development. 214 children began the study in kindergarten (age 5 years), and were assessed annually (twice in grade 1) up to grade 3. Each year multiple measures of naming speed, phonological awareness, and reading ability were administered. Over the four years of the study, the number of children decreased to 147. Results of repeated measures analyses of variance and hierarchical regression analyses indicated that (a) naming speed increased with age, (b) naming speed of alphanumeric stimuli was a better predictor of reading than was naming speed of objects and colours, (c) concurrent measures of naming speed were better predictors of reading than were earlier measures, (d) naming speed had a strong relationship with timed and orthographic measures of reading, and (e) the relationship between naming speed and reading was stronger among less able than more able children. Implications for theories of reading, reading education, and special education are discussed.

B 11
28 August 2007 17:30 - 18:50
Room: Harmónia
Paper Session

Different aspects of teaching

Chair: **Sylvia Rojas,** National Autonomous University of Mexico, *Mexico*

E-teaching readiness of teachers - The effects of personality traits on ICT skills and teaching style
Andrea Kárpáti, Eötvös University, Budapest, *Hungary*
Balázs Török, Institute for Research on Higher Education, *Hungary*
Anna Linda Szirmai, Eötvös University, Budapest, *Hungary*

Surveys on the spread of computer culture in education unanimously position teachers as key factors for the success of ICT in schools but the percentage of teachers using ICT regularly in class as reported by national assessment projects has not increased considerably since the eighties. Our assumption is that failure of in-service ICT teacher training courses to produce conceptual change among teachers towards ICT is due to their concentration on technology and not pedagogy and personality development. EPICT, the European Pedagogical ICT Licence (www.epict.org) is based on collaboration of teacher teams mentored in a highly interactive e-learning environment by experienced peers. In order to identify ICT-relevant individual characteristics reflected in technology acquisition strategies, response to different types of mentoring and quality of course tasks, we correlated the California Personality Inventory (CPI), measuring key factors of the self and correlated it with our own ICT Competency Inventory (ICT-CI) to reveal correlations between ICT based teaching – learning methods and personality characteristics. Our sample included 120

primary and secondary teachers aged 30-53, 60% females. ICT-CI and CPI were administered at the end of the 120-hour course. This paper discusses personality features that may be associated with success or failure to acquire ICT skills on a level sufficient for educational use. Strong correlation between social skills and success in ICT use suggest that pedagogical strategies in ICT use may be affected by targeting both the professional and personal self of teachers. An adaptive learning environment, and mentoring methods designed to suit not only the initial level of technological skills but also the mindset of teachers may enhance e-teaching readiness. (Study related to work of the Research Group on the Development of Competencies, Hungarian Academy of Sciences - University of Szeged.)

"It's all in your head!":Pre-service teachers and the confounding of ethnic minority and low socioeconomic status
Revathy Kumar, University of Toledo, *USA*

This study draws upon Social Identity theory to hypothesize that when White middle-class, pre-service teachers respond to survey items about beliefs regarding ethnic minority or low socioeconomic status (SES) students, values associated with their own identity as White and middle-class become salient. Consequently, pre-service teachers may fail to distinguish between the two social identities and may characterize ethnic minority and low SES students as possessing similar attributes. Quantitative methods (exploratory and confirmatory factor analysis) and qualitative interviews are employed to examine the reliability consistency and factorial and construct validities of the items in two scales measuring pre-service teachers' beliefs regarding ethnic minority and low SES students. Implications regarding rigor in research and curriculum development for pre-service teachers are discussed.

The challenge of self-directed learning in a teacher education programme.
Francis Lopez-Real, The University of Hong Kong, *Hong Kong*
Tammy Kwan, The University of Hong Kong, *Hong Kong*
Ming-Fai Pang, The University of Hong Kong, *Hong Kong*

In the 2004-2005 academic year, the PGDE programme at the University of Hong Kong introduced a significant new element into its course, namely a Self-Directed Learning (SDL) component. This was part of a general re-structuring of the programme and was intended to help students effectively integrate the theoretical and field experience components of the course and, through the process of self-directed learning, to empower them to become autonomous, critically reflective professionals. Two-hour sessions were regularly time-tabled throughout the year during which groups of students had complete control over what their learning objectives would be for each session and how they would organize the session. In other words, they were driving their own learning agenda. However, self-directed learning does not necessarily imply unsupported learning, and various support mechanisms (such as an SDL Guidebook) and monitoring processes were also put in place. This paper reports on the first stages of an action research project focusing on this innovation. It describes how this new component was implemented, and analyses the experiences of the students, the outcomes in terms of benefits and difficulties, and the implications for the ongoing development of SDL within the programme. Data were collected from questionnaires completed by all student teachers, video recordings of a number of different groups, and structured group interviews.

Identity construction of teacher-mentors
Tammy Kwan, The University of Hong Kong, *Hong Kong*
Francis Lopez-Real, The University of Hong Kong, *Hong Kong*

An important component in the theory of communities of practice is that of identity. Lave and Wenger (1991) refer to learners' identities being 'transformed' through performing new tasks and demonstrating new understanding. Although the emphasis of their work is on the identity construction of the novice entering a community of practice, existing members of the community of practice itself are also transformed and this results in a two-way process of identity co-construction (Wenger, 1998). Subsequent studies with respect to teacher education have also placed the emphasis on the professional learning and development of the student-teachers and how they form their identity when entering the teaching profession. However, very few studies have looked at the formation of the teacher-mentors' identity and their professional learning. This paper focuses on the teacher-mentors and how their identities are constructed during the process of mentoring student-teachers. Wenger (2002) describes three 'modes of belonging' in the process of identity formation, namely engagement, imagination and alignment. In order to understand and analyse what constitutes a 'healthy' identity, Wenger further proposes three 'qualities', namely connectedness, expansiveness and effectiveness. By combining these elements into a matrix structure Wenger suggests that the way each mode of belonging contributes to the three qualities can be explored. Using a case study method, the mentoring experiences of two teacher-mentors are reported and analysed using Wenger's matrix framework to interpret how their identities are constructed. It should be made clear that this refers to their identity as a mentor. That is, we focus on those elements that strengthen or weaken their identity within the specific community of practice constituted by their mentor role, which includes the school culture and the 'personalities' of the other community members.

B 12
28 August 2007 17:30 - 18:50
Room: 7.59
Paper Session

Teacher education

Chair: **Iván Falus,** ELTE University, *Hungary*

Learning all over again: developing potential for discovery and action
Hafdis Gudjonsdottir, Iceland University of Education, *Iceland*
Mary Dalmau, Victoria University, *Australia*

In this paper we discuss critical elements of an approach to teaching and learning "Active Group Practice" with pre-service and practicing teachers developed over ten years of collaborative, international self-study research in Australia, Iceland, Europe and USA. "Active Group Practice," is the skillful, engagement of a diverse group of educators in collaborative action to implement or improve educational programs, through a reflective, problem-solving approach to praxis inquiry. (xxxx, 2004) Effective teaching and learning of "Active Group Practice" means that over time group members develop the knowledge, understanding and skills necessary to cooperatively

implement or improve their teaching and educational programs in a number of environments, and to invite others to create work collaboratively and constructively with them.

Portfolio's mediation during co-assessment dialogues
Walther Tessaro, University of Geneva, *Switzerland*
Lucie Mottier Lopez, University of Geneva, *Switzerland*

Portfolios are increasingly being used in teacher education. They are designed to promote meaningful and authentic assessment in relevant contexts, as an "alternative assessment" favoring the development of potentials for learning. They are frequently accompanied by reflective activities and by interactions in different social formats with peers and supervisors, aimed at the negotiation of meaning and the construction of shared understanding. Among the different types of portfolios used in teacher education, we are interested in those whose purpose is to assess students' progress in the development of their professional skills. We propose to study, in a situated assessment perspective, the relations between cultural and material tools, social interactions and assessment practices. More precisely, we investigate the possible forms of instrumental mediation provided by portfolios to co-assessment exchanges. Our research was carried out in the context of a program for future primary school teachers. Our paper presents an in-depth analysis of co-assessment discussions between the supervisor and eight students. A comparison is made between the documents in the portfolio and the topics of the co-assessment interactions during the conference. Our analyses show that the supervisor refers more frequently to the portfolio during the conferences than the students. Three cases can be distinguished concerning the mediation of his assessment activity. The students explicitly refer to the portfolio in order to assess their professional progression, in particular during in-service trainings. It appears that indirect mediation of the portfolio is seen as an interpretative background for co-assessment exchanges. On the basis of our results, we show the extent to which co-assessment interactions produce new interpretations and appraisals of students' professional skills in comparison with the self-assessments already expressed by the students in their portfolios.

How are science teachers' conceptions about the Nature of Science constructed? Influence of initial preparation and professional environment.
Fernando Flores-Camacho, CCADET-UNAM, *Mexico*
Leticia Gallegos-Cazares, CCADET-UNAM, *Mexico*
Xochitl Bonilla-Pedroza, CCADET-UNAM, *Mexico*
Flor Reyes-Cardenas, CCADET-UNAM, *Mexico*

In this investigation, we analyzed the impact that different factors such as schooling, professional milieu, readings, science popularization, and mass media have had in Mexican science teachers' conceptions about the nature of science. From a semi-structured interview with 53 teachers, 14 categories were identified to describe science conceptions and its origins. These categories were organized around four main topics: Conceptions about science; Awareness of changes in their conceptions; Transformation factors; and Teaching aspects. This research was conducted with teachers in 10 different states, so it includes teachers from different schools, backgrounds and contexts. Results show that there are different factors which influence teachers' conceptions about science. These factors are more related to science popularization and mass media than to their initial preparation or professional environment.

What do Mexican science teachers know about the disciplines they teach?
Leticia Gallegos-Cazares, CCADET-UNAM, *Mexico*
Fernando Flores-Camacho, CCADET-UNAM, *Mexico*
Alejandra Garcia-Franco, CCADET-UNAM, *Mexico*
Eduardo Vega-Murguia, CCADET-UNAM, *Mexico*
Beatriz Garcia-Rivera, CCADET-UNAM, *Mexico*

Recent results in international evaluations, such as PISA (OECD, 2003), have made evident many problems in secondary education (ages 12-15) in Mexico. In this context, this investigation was proposed as a way to find out what is the level of comprehension of science teachers about core concepts in their disciplines (physics, chemistry and biology). Questionnaires and interviews were designed in order to determine three different levels of comprehension about ten core concepts in each discipline. Teachers in this study are from ten different states and are considered descriptive of teachers in the country. Results manifest that for most teachers, comprehension does not go beyond the first level, similar to the comprehension level students are expected to have once they have finished secondary school. It is possible to relate students' poor performance in international evaluations with teachers' poor understanding of basic concepts. We propose some ways in which this situation could be addressed.

B 13
28 August 2007 17:30 - 18:50
Room: 0.100C
Paper Session

Social interaction in learning and instruction

Chair: **Beatrice Ligorio,** University of Bari, *Italy*

Learners' pragmatic awareness: A case study with implications for second language learning and instruction
Maria Dolores Garcia-Pastor, University of Valencia, *Spain*

Research on second language learning and instruction has recently acknowledged and empirically proved in the main that pragmatic awareness has an influence in learners' adequate performance in a second language (L2). Pragmatic awareness refers to learners' conscious knowledge of distinct linguistic, relational and socio-cultural assumptions operating across communicative situations and informing determinate linguistic choices in a given language. The present research explores the pragmatic awareness of a community of Spanish learners of English as a second language (ESL) temporarily living in the U.S. as regards the formulation of the specific communicative act of 'directives' in their first and second languages. It is believed that the enhancement of learners' pragmatic perceptions of their own language (L1) facilitates awareness-raising of the differences and similarities between L1 and L2 pragmatics, hence pragmatic aspects in the latter. The data used for this study includes conversational encounters conducted in learners' first language and ESL, interview data, and field notes and memos produced by the researcher as a result of participant observation. Ervin-Tripp's (1976) typology of directives and Hymes' (1972) descriptive framework guided the analysis together with Spradley's (1980) Developmental Research Sequence (DRS). Results of the study mainly show that learners' directive performance

in their first and second languages was related to the enactment of a series of speech events or communicative activities that were governed by distinct linguistic, relational and socio-cultural assumptions in each language. One of the principal implications of the study for second language learning and instruction is that L2 learning and teaching should be organised around speech events or activities as opposed to centring on isolated communicative acts as a good way to raise learners' pragmatic awareness in the target language.

Creating potentials for learning through the visual
Judith MacCallum, Murdoch University, *Australia*
Peter Wright, Murdoch University, *Australia*
Kathryn Grushka, Newcastle University, *Australia*
Robin Pascoe, Murdoch University, *Australia*
Judith Dinham, Edith Cowan University, *Australia*

Visual Education is an emerging field of practice. There is a compelling case for visual education based on the increasing dominance and importance of visual forms of communication, its role in leading creativity and innovation in shifts towards a 'knowledge-based economy', and in developing important understandings about each person's sense of self and identity as well as their place in society. This paper presents a model of effective practice in visual education developed as one part of a large national research project. The model draws specifically on perspectives and practices examined from purposive sampling of sites of effective practice, and focus groups and interviews with teachers, students and art professionals. From a sociocultural perspective learning is mediated through signs ('psychological tools') and tools ('technical tools'), individual activity and social relations, which fundamentally shape and transform mental processes. The research found that effective visual education was situated in studio-based experience/activity that featured working with materials and relationships of trust, and the development of applied aesthetic understanding. Students' personal, social and cultural agency emerges from these practices. The full model developed from the analyses provides evidence of the processes used by teachers, with meaning created and embedded within the learning setting, mediated by the tools being used and the forms of interaction and relationships developed. Together, these provide the means for creating learning potentials through the visual and the opportunity for learners to become effective and creative participants in an innovative visual society.

Instructing with analogies : the rhetorics of analogical discourse in vocational training interactions
Ingrid de Saint-Georges, University of Geneva, *Switzerland*
Barbara Duc, University of Geneva, *Switzerland*
Laurent Filliettaz, University of Geneva, *Switzerland*

This paper focuses on initial vocational training and apprenticeship in the technical fields of automotive mechanics, masonry and electronics in a "dual" learning environment, alternating periods in school and in the workplace. In these fields, instructors or teachers often mobilize analogical reasoning to explain technical gestures (filing, welding, mixing, rendering), positions or abstract notions linked to professional practices. Our interest is in probing the role of this analogical reasoning in educational situations by 1) studying when and to what extent apprentices are exposed to analogical discourses both at school and in the workplace in their trajectory of apprenticeship, 2) establish the formal and functional characteristics of these analogical registers from the point of view of a multimodal approach to discourse analysis, and 3) more generally, show the relevance and usefulness of a discursive approach for the study of educational situations

and vocational training interactions in particular. In order to address these issues, the paper will propose a detailed analysis of a set of video recordings documenting real-time activities accomplished by apprentices in the Swiss vocational education system.

Promoting productive collaboration for learning scientific concepts
Erica Sainsbury, The University of Sydney, *Australia*
Richard Walker, The University of Sydney, *Australia*

A study was undertaken of the relationship between the processes and outcomes of learning in a first year Australian university cohort. Pharmacy students at the University of Sydney must learn to distinguish between the chemistry which is familiar from high school, and different conceptual meanings which are accepted in pharmacy. A topic of particular difficulty is "acids and bases": identical terms used in the two disciplines carry different meanings in different situations, and students have consistently struggled with discriminating between them. The current study was undertaken to investigate the significance of particular aspects of the learning environment on the long-term learning of pharmacy conceptual understanding of acids and bases. The processes of learning were studied through the use of videotapes of normal class activities, where small student groups worked together on a series of tasks designed to promote collaborative discussion and problem solving. The outcomes of learning were investigated through the use of semi-structured interviews where students were given the opportunity to express their understanding in verbal dialogue with the interviewer. The results were used to describe a model relating learning to the nature of the social interactions which were apparent amongst group members during their workshops sessions. A positive relationship was identified between productive collaborative interactions and the formation of zones of proximal development, the development of intersubjectivity and the promotion of long term conceptual learning. Members of groups which engaged in less productive interactions displayed reduced long-term learning; this was associated with lower levels of intersubjectivity and limited formation of zones of proximal development. These findings provide a theoretical model for the design of supportive environments for the learning of scientific concepts and suggest a number of dimensions which are likely to be important in promoting productive interactions amongst groups of learners.

B 14
28 August 2007 17:30 - 18:50
Room: 0.79 Jánossy
Paper Session

Student learning in higher education

Chair: **Carmen Vizcarro,** Universidad de Castilla la Mancha, *Spain*

A pilot exploration of doctoral students' conceptions of research
Jan Meyer, University of Durham, *United Kingdom*
Douglas Halliday, University of Durham, *United Kingdom*

There is a limited literature on students' conceptions of research and the earliest reported work on this topic is believed to be the seminal study by Meyer, Shanahan and Laugksh (2005). This two-part study, embracing both a qualitative and a quantitative methodological component, established

the existence of inter-individual differences in postgraduate students' conceptions of research thus laying a foundation for subsequent comparative work by Meyer, Shanahan and Laugksh (2007). In essence these two studies consolidate findings in terms of five conceptually discrete dimensions of variation: discovering the truth, insightful exploration and discovery, re-examining existing knowledge, problem-based activity, and a set of misconceptions. The present study extends this earlier work in the important respect of focussing on a sample of doctoral students in a research intensive university. Initial findings support the existence of the five previously mentioned dimensions of variation and further extend them in terms of research as information gathering and a scientific process. Variation within these seven conceptually discrete dimensions is explored in the doctoral student sample according to broad disciplinary field of study (Science and Engineering. Arts and Humanities, Social Sciences and Health), gender, and status in terms of being an overseas student with English as a first language. Field and status but not gender exhibit a statistically significant overall effect. Analyses of structural (covariance) differences according to field are presently underway and findings will be reported at the EARLI Conference. Although work of this nature is still in its infancy it is clear from the findings of the present and earlier studies that there is multivariate complexity in the manner in which postgraduate students differ in their conceptions of research. In focussing exclusively on doctoral students the present study reports findings that are discussed in terms of their capacity to inform the 'pedagogy' of postgraduate training.

Media-based university courses - two surveys of students' experiences and expectations
Manuela Paechter, University of Graz, *Austria*
Barbara Fritz, University of Graz, *Austria*
Brigitte Maier, University of Graz, *Austria*
Simone Manhal, University of Graz, *Austria*

Which aspects of media-based courses (pure e-learning or blended-learning courses) do students experience as being favorable or as being unfavorable for learning? What expectations do they have on media-based courses? These questions were investigated in two surveys. In survey 1, 450 students from 8 Austrian universities were interviewed about their experiences and expectations with regard to five critical didactic components of a course (cf. Ehlers et al., 2004): 1) Didactic design and presentation of the course material, 2) interaction with the tutor, 3) communication and cooperation with peer learners, 4) support of individual, self-regulated learning, 5) learning outcomes. In a content analysis, students' answers were categorized according to the five components and subcategories within these components. All in all, students reported distinct advantages and disadvantages of media-based courses. They emphasized the flexibility and the self-regulation of learning as well as the manifold possibilities to communicate with peers as main advantages. On the other hand, students reported dissatisfaction with the course material (e.g., a lack of clarity, the absence of exercises) and they wished more tutorial support. With regard to the learning outcomes, the possibility to acquire media competence was an important factor for the choice of a course. In survey 2, nearly 2000 students from 21 Austrian universities (at least two universities from each federal state) and from all scientific fields participated. They filled in a standardized questionnaire about their experiences in a media-based course which they have been presently visiting and about their expectations on media-based courses in general. Furthermore, students were to compare learning in media-based courses to learning in traditional courses. Again, students reported very distinct advantages and disadvantages. First analyses indicate that overall the self-regulation of the learning processes but also the manifold possibilities for communication and cooperation are regarded as main advantages of media-based courses.

Enhancing educational argumentation – effects of a problem-oriented e-learning environment
Robin Stark, Saarland University, *Germany*
Ulrike-Marie Krause, Saarland University, *Germany*

Constructing valid and convincing arguments in educational discourses is a complex key ability that cannot be expected to emerge automatically from traditional university training. Even advanced students have difficulties constructing scientific arguments. In order to foster cognitive and motivational prerequisites for scientific argumentation as well as informed beliefs concerning research methods, a problem-oriented e-learning environment (WALe) was conceptualised. A field study was carried out with 43 advanced students of education. Working with WALe resulted in significant learning gains. However, more than half of the students still had problems applying simple statistical concepts and procedures. Most students were entirely overtaxed by dealing with complex statistical procedures and with argumentation tasks. Qualitative analyses of pre- and post-test answers showed that knowledge gaps and misconceptions concerning statistical concepts and procedures and the status and meaning of theories still existed after the intervention. Focussing on various learning prerequisites, three different clusters were identified. Students in cluster 1 had low means in all prerequisites, especially in prior knowledge and intrinsic motivation ("uninformed and unmotivated"). Cluster-2 students showed a reversed pattern with especially high means in prior knowledge and motivation ("knowledgeable and motivated"). The third cluster was characterised by high means in nañve beliefs and motivation ("uncritical and motivated"). In the post-test, the cluster characterised as "knowledgeable and motivated" outperformed the other two clusters which differed only marginally. This cluster also displayed the highest learning gains. Our results give new insights into the complex phenomenon of skill acquisition in a rather ill-structured area under field conditions. Furthermore, the relevance of cognitive and motivational prerequisites in this process is highlighted. In order to compensate for deficits in prior knowledge and motivation, broader reforms of university training in research methods and argumentation are necessary.

Towards better learning – Supporting university physics students in seeing a whole
Ake Ingerman, Chalmers University of Technology, *Sweden*
Karin Carling, Karlstad Univeristy, *Sweden*
Shirley Booth, Lund University, *Sweden*

In response to a phenomenographic investigation into how physics students experienced the whole of their first year in a physics Master of science-program (Booth and Ingerman, 2002), the course 'Towards better learning' was developed. The core aim of the course is to support students in seeing a whole related to physics. The investigation suggested that a substantial number of the interviewees were restricted to seeing a whole of their educational experience in terms of the programme's organisation and the structure of their studying, while the content of physics did not play any role in that whole (or fragmented) experience. The starting point for the course was the conjecture that students through articulation and reflection around their learning can become more aware of their own learning, and make more conscious choices about their study situation. The course is offered during the students' first semester based on regular small-group meetings, where students move from analysing their study situation in different ways, over other students' study situations, to lectures (and other forms of teaching) and teachers' perspective on teaching and the impact of that on the students' situation. We will outline the course, examine its grounding on the results of the original investigation, and discuss the value of the course in relation to its central aims. The results, in the form of an evaluation of the course, are the next steps in the research-development-research cycle we have been following. The evaluation consists mainly of two parts:

1) a qualitative analysis of the development of the students' understanding of studying 'effectively' – a concept with contradictory implications when seen in relation to different goals. 2) a similar analysis of students' concluding 'evaluation' essays. Booth, S. & Ingerman, A. Making sense of Physics in the first year of study, Learning & Instruction, 12, 493-507, 2002.

B 15
28 August 2007 17:30 - 18:50
Room: 0.100A
Paper Session

Teaching in higher education

Chair: **Robert Jan Simons,** University of Utrecht, *Netherlands*

The development of new teachers' conceptions and approaches to teaching in higher education
Ian Sadler, York St John University, *United Kingdom*

The current study uses empirical data to illustrate how novice teachers in higher education develop in the way they think and go about their teaching. Three longitudinal interviews over a period of two years were conducted with twelve new teachers. Participants were teaching in a range of higher education institutions and settings, as well as across a range of disciplines including; Sport Science, Physiotherapy, Psychology and History. Interview transcripts were analysed using a combination of phenomenography and case studies. This allowed for general categories of description to be created while at the same time preserving the idiosyncratic nature of development. The analysis identified a number of themes which are supplemented by context specific experiences of individuals. The emerging themes relate to the new teachers understanding of teaching, development in this understanding of teaching and the influences upon this development. Case studies of individual teachers' experiences illustrate the importance of the subject discipline upon teaching and the development of teaching. Factors which appear to influence development include; confidence, knowledge of teaching in the discipline, experimentation with student activities and feedback and reflection. Such data has value for informing teaching development programmes for new teachers in higher education.

Relations between dissonance and change in ways of experiencing university teaching
Jo McKenzie, University of Technology, Sydney, *Australia*

While there have been a number of studies of dissonance in student learning, less attention has been focused on dissonance in the experience of university teaching. This paper explores dissonance and its relation to change in ways of experiencing university teaching, using a longitudinal qualitative approach based on phenomenography and variation theory. Analysis of interviews with university teachers revealed two broad forms of dissonance. One involved acts of teaching which were dissonant with the teacher's intention in a particular situation, the other involved ways of experiencing which were congruent and coherent with the teacher's perceptions of their situation but dissonant with the teacher's preferred way of experiencing teaching. The findings suggest that dissonance may resolve if the teacher experiences it as dissonance and is aware of necessary patterns of variation in aspects of ways of experiencing teaching.

Developing a research community in higher education: from Student feedback to knowledge construction
Naomi Irvine, University of Cambridge, *United Kingdom*
Patrick Carmichael, University of Cambridge, *United Kingdom*

This paper describes a series of research and development projects into teaching and learning practices in Higher Education which have been undertaken at the University of Cambridge under the auspices of the Pedagogy Programme of the Cambridge-MIT Institute (CMI). These have involved a collaboration between groups of staff and students in participating departments and a team of education researchers based at the Centre for Applied Research in Education Technologies (CARET). We describe the evolution, over a period of about two years, of an organisation (CARET), of research processes, of educational practices and resources, and of roles and relationships of researchers and participants. Most critically there has been a negotiation of norms and expectations on the part of participants and the legitmization of discourses in a shared 'problem space'. The research and development process can be conceptualised as one of 'co-configuration' with continual renegotiation of requirements and solutions. Roles and approaches have developed as researchers have gained better understanding of the priorities and 'ways of thinking and practicing' of other participants and those participants have in turn become familiar with the techniques and theoretical perspectives of education researchers. The importance of 'boundary-crossing' objects which provide points of focus for discourse and development is discussed, and what these might be in the context of education research and development projects. The paper concludes with a description of a new initiative informed by this view of research and development as co-configuration: the Teaching for Learning Network (TfLN), designed to support further pedagogical interventions across a variety of disciplines and institutions.

University teacher identities and graduate attributes: What are we becoming?
Simon Barrie, The University of Sydney, *Australia*
Carolin Kreber, The University of Edinburgh, *United Kingdom*
Velda McCune, The University of Edinburgh, *United Kingdom*

This paper reports on qualitative research in Australia and the UK, which explored the issue of formation of teacher identity in university academics and how this identity might contribute to the development of the sorts of generic outcomes espoused by higher education. The Australian component of the research investigated the identities academics in different disciplines reported as being embodied in their teaching and their participation in the academic life of their department, which served to foster the development in students of the universities core generic graduate attributes of scholarship, lifelong learning and global citizenship. The UK component of the research identified the complex factors that contribute to shaping academic identity based in a process of learning as participants in a community of practice. The paper reports the findings of these studies and, through a synthesis of the findings, offers a new perspective for considering academic identity and its formation, in relation to the core outcomes of higher education. In doing so it offers some preliminary insights linking academic identity formation with the process of identity formation espoused for students in higher education. An idea of academic identity is advanced in relation to the needs of today's learners, which encompasses the characteristic 'actions' of academics in their teaching and interactions as members of the university of community and a consideration of the factors that influence the formation of such an academic identity. A key feature of the findings is the need for authenticity in teaching and engaging with learners as members of academic communities of practice. The implications for curriculum reform and academic practice will be considered. An argument will be advanced for a reconsideration of

current attempts to define academic work in terms of narrow performance standards and current approaches to academic development will be questioned in relation the findings.

B 16
28 August 2007 17:30 - 18:50
Room: 1.60
Paper Session

Teacher professional development

Chair: **Pnevmatikos Dimitris,** University of Western Macedonia, *Greece*

Predicting teachers' satisfaction with supervision instructional programs
Nir Adam, The Hebrew University of Jerusalem, *Israel*
Bogler Ronit, The Open University, *Israel*

This study aims to expand our understanding on how teachers' preferences regarding supervision instructional programs and their perceptions about their work affect their level of satisfaction with the programs. Based on a sample of 841 teachers employed in 118 elementary schools, regression analyses were conducted to determine which variables that are related to teachers' instructional programs and to teachers' self-perceptions, best predict their satisfaction with the programs. The findings demonstrate that the main factors affecting teachers' satisfaction with the instructional programs are related to their preferences to maintain instructional processes "close to home". Consequently, we conclude that teachers' satisfaction with the programs is closely related to their ability to design the programs in accordance with their needs.

Changing teaching practice mentors' conceptions of supporting student teachers' learning in internships
Kreis Annelies, University of Teacher Education Thurgau, *Switzerland*
Fritz C. Staub, Departement of Education, University of Fribourg, *Switzerland*

Internships are a traditional element in the programs of Swiss universities of teacher education, and teaching practice mentors therefore play a pivotal role. Models of reflective practice (e.g. Putnam & Borko, 2000) view the role of a mentor as being a competent and critical companion. Content-Focused Coaching (West & Staub, 2003) suggests a more active and collaborative role for mentors during the planning and enactment of lessons with an emphasis on pedagogical content knowledge (Shulman, 1987). As part of a quasi-experimental multi-method study an intervention with mentors (primary school grade 1-6) was implemented on the basis of Content-Focused Coaching. This paper focuses on one of the major aims of the intervention: changing mentors' conceptions on how to support student teachers' learning. Before and subsequent to the intervention, conceptions of 16 mentors of a control group and 15 mentors of the intervention group have been investigated by means of an extensive questionnaire. It covers mentors' views of their role, their ways of assisting student teachers' learning, the frequency of issues raised in pre- and post-lesson conferences and the temporal organisation of lesson conferences. Results show that intervention and control group did not differ significantly in the pre-test. In the control group there were no significant changes between pre- and post-test data. Mentors in the intervention group, however, manifested significant changes: pre-lesson conferences are more strongly

emphasised than post-lesson conferences, core issues proposed by the model are more frequently raised and mentors adopt a more active role in the classroom while student teachers are teaching. These findings are corroborated by extensive qualitative data (interviews with mentors and student teachers and videotapes of conferences).

Impact of a generic instructional development programme on teaching approach and behaviour
Ann Stes, University of Antwerp, *Belgium*
Coertjens Liesje, University of Antwerp, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*

This study focuses on two research questions: (1) Does a generic instructional development programme have an impact on teaching approach? (2) Do students perceive an alteration in teaching behaviour due to novice faculty training? Data were retrieved from a quasi-experimental pre-test/post-test-design. The teachers (n=50) filled out a Dutch version of Trigwell and Prosser's (1996) Approaches to Teaching Inventory (ATI). Their students (n=2110) completed a translation of Entwistle's (2005) Experiences of Teaching and Learning Questionnaire (ETLQ). In so far as teaching behaviour is concerned, training seems to enhance a 'conceptual change/student-focused approach'. From pre-test to post-test, the experimental group augments significantly more on this scale than the control group. Nevertheless, students perceive little change in teaching behaviour. Only teaching behaviour related to assessment, and more specifically to clarity and feedback about assessment seems – at short term – apt to improvement due to a novice teacher training.

Professional learning at multiple levels in a project designed to raise student achievement
Judy Parr, University of Auckland, *New Zealand*
Helen Timperley, University of Auckland, *New Zealand*

Quality teaching has a significant influence on a range of student outcomes (Alton-Lee, 2003; Nye, Konstantopoulos, & Hedges, 2004; Rowan, Correnti and Millar, 2002). If teachers are to maximize their influence in a context where teaching challenges are not static, then they, like their students, need opportunities to deepen their understandings and refine their skills. This paper discusses a national school-based (N = 91), job-embedded model of professional development in literacy that involves expert facilitators working with schools and aims to reduce the extent and nature of disparity in literacy achievement. The project has had a demonstrable effect. Over two years, the average added value (compared to expected normative gain) effect size gain in writing achievement was .81. This is sizeable, given that schooling improvement effect size gains reportedly average less than .2 for a similar time period (Borman, 2005). Features of the project, seen to account for its success, are examined. Centrally, it was designed to be both evidence-informed and needs-based at all levels and to use evidence to lever change. There was ongoing monitoring, feedback and adjustment, based on evidence, with efforts to change practice implemented with support. There was significant coherence at, and among, all levels of the project. All levels learnt from evidence, using it to guide their decisions about practices, from the Ministry of Education, to the project lead team, to facilitators, literacy leaders in schools, teachers and students. Learning or identified need at one level informed what happened at another. We conceptualise this within a formative assessment framework that operates to create the learning within activities at all levels within the system. In the paper we illustrate this learning at each level, identifying how learning or needs at one level had implications for other levels of the project.

B 17
28 August 2007 17:30 - 18:50
Room: 0.65
Paper Session

Reading

Chair: **Christa van Kraayenoord,** The University of Queensland, *Australia*

Motivation for reading comprehension
Oistein Anmarkrud, University of Oslo, *Norway*
Ivar Bråten, University of Oslo, *Norway*
Marit S. Samuelstuen, Norwegian University of Science and Technology, *Norway*

In a sample of 104 Norwegian ninth-grade students, we examined whether perceived reading efficacy and reading task value uniquely contributed to the comprehension of social studies text after variance associated with gender, achievement level, topic knowledge, and text-processing strategies had been removed. Participants read a text about socialization for the purpose of taking a test. Before reading, participants' motivation for reading comprehension and their prior knowledge about the topic of the text were assessed. Immediately after reading, participants reported on the text-processing strategies they had been using while reading the text. Finally, participants' reading comprehension was assessed with a multiple-choice test. To analyze the data, we performed forced-order hierarchical multiple regression analysis with the reading comprehension measure as the dependent variable. In step one, gender and achievement level were entered into the equation. In step two, we included scores on the topic knowledge measure as well as on measures of deep- and surface-level strategies. Finally, in step three, we entered measures of reading efficacy and reading task value. Results showed that even after removing variance from the variables entered in steps one and two, the motivation variables entered in step three accounted for additional variance. In step three, a statistically significant positive relationship was found for reading task value, whereas the relationship between reading efficacy and reading comprehension did not reach statistical significance. Thus, students' reading task value seems particularly important to student reading comprehension because it may override the contributions of other important constructs. In terms of education, this suggests that an emphasis on cognitive constructs such as prior knowledge and strategic text-processing should not make us overlook the specific importance of promoting motivation for reading comprehension.

Improving students' reading comprehension by means of developing reading strategies. Results from a Hungarian experiment
János Steklács, Kecskemét College, *Hungary*
Csaba Csíkos, University of Szeged, *Hungary*

Research on reading comprehension has revealed that one of the most important criterium of good readers is using effective reading strategies. (Almasi 2003, Pressley 2006) There is a general agreement among researchers that one of the most important theoretical and –at the same time: practical – question is how to teach effective reading strategies in schools. Numerous publications show and evaluate many kinds of strategies, but the most effective ones seem to be: activisation of prior knowledge, prioritizing information, questioning the author and the text, evoking sensory images, drawing inferences, retelling, synthesizing, and using fix-up strategies. On the basis of the above mentioned theory, we created an experimental training program which was based on

teaching reading in Hungary. The experiment involved 4th grade students from 5 schools, 9 classes. We held a meeting for the teachers of the classes before the research, and kept in touch during the 8 weeks. Regular classroom lessons were restructured with the aim of developing students' reading strategies. The experiment and control classes solved the same pre- and post-tests and a questionaire which was the shortened version of Jacobs and Paris' IRA test. The groups had similar results in pre-test phase, but we found significant differences in post-test. Pupils who were in the experiment classes solved the test better. Cohen's experimental effect coefficient (f) proved to be 5.6%.

Working memory influences on reading comprehension assessed with different measures
Rune Andreassen, Ostfold University College, *Norway*
Ivar Bråten, University of Oslo, *Norway*

The study addressed the influence of middle grade pupils' gender, word recognition, strategy use, reading motivation, and working memory on reading comprehension assessed five months later using three different reading comprehension measures. In particular, working memory demands were supposed to depend largely on how reading comprehension was measured. A battery of tests was administered at two different times to 216 Norwegian fifth grade children to measure predictor variables and reading comprehension performance, respectively. Hierarchical regressions were performed using the three different reading comprehension measures as dependent variables. The results supported the notion that reading comprehension seems to require different amounts of working memory resources depending on how reading comprehension is operationalized and tested. Specifically, this research demonstrated that there may be substantial differences in working memory demands between multiple choice tests with text not available while answering comprehension questions and tests where text or pictures are available while answering questions. Testing reading comprehension by using multiple questions with the text available could be seen as testing readers' competence in searching for the right answer in a present text. Answering questions without the text available, however, could be seen as largely dependent of the reader's memory skills. This finding has theoretical as well as educational implications.

Which discriminants characterize effective/ineffective grade three classes in reading and what can be learnt about effective instruction from those descriptions?
Ulla Damber, Mid Sweden University, *Sweden*

The purpose of this study was to gain insights into how teachers can assist low performing students to bridge the achievement gap. Between 1997 and 1999 all Stockholm schools participated in studies examining grade three students' literacy acquisition. Traditional reading tests measured reading ability. Student and teacher questionnaires gathered data on teacher, classroom and student characteristics. 999 classes and their teachers participated, the class used as unit for analysis of student results. By controlling for socioeconomic background factors three groups for statistical analysis of variance were formed; one of underachieving classes, one of overachieving and of classes performing as expected, in order to put focus on the impact of teachers' work. Socioeconomic background factors proved hard to overcome though, even if indications of overachieving classes reading more authentic literature were found. A more pleasant classroom climate was indicated in analysis of several variables. In order to highlight questions demanding answers from a practitioner's point of view partly diverging theoretical views were used in the analysis of results. A follow-up study is being developed focusing on overachieving ethnically diverse classes in low-SES areas where a literature based programme was implemented. A literature review of this programme has been made, as well as descriptive statistics focusing on

these classes. By interviewing key persons and teachers in the project more insights into mechanisms resulting in students' surprisingly good reading test results will hopefully emerge. Classroom climate, social interaction in the classroom, teachers' expectations and teachers' engagement and are fields of interest yet to be highlighted. With this broad attempt to view reading acquisition and reading comprehension interesting future areas of development are emerging, calling for further research using multiple methods.

B 18
28 August 2007 17:30 - 18:50
Room: 0.87 Marx
Paper Session

Computer-supported learning environments

Chair: **Tina Hascher,** Universität Salzburg, *Austria*

Effects of constructivist technology-intensive learning environments versus traditional ones on students' achievement: A meta-analysis
Yigal Rosen, University of Haifa, *Israel*

Different learning environments provide different learning experiences and ought to serve different achievement goals. It was hypothesized that constructivist learning environments lead to the attainment of achievements that are consistent with the experiences that such settings provide and that more traditional settings lead to the attainments of other kinds of achievement in accordance with the experiences they provide. A meta-analytic study was carried out on 32 methodologically-appropriate experiments in which these two settings were compared. Results supported one of the hypotheses showing that overall constructivist learning environments are more effective than traditional ones (ES=.46) and that their superiority increases when tested against constructivist-appropriate measures (ES=.90). However, contrary to expectations, traditional settings did not differ from constructivist ones when traditionally-appropriate measures were used. A number of possible interpretations are offered among them the possibility that traditional settings have come to incorporate some constructivist elements. This possibility is supported by other findings of this study such as smaller effect sizes for more recent studies and for longer lasting periods of instruction.

What is it? Students' pursuing problems in a CSCL environment designed within the field of science education
Ingeborg Krange, University of Oslo, *Norway*
Sten Ludvigsen, University of Oslo, *Norway*

We address how students approach curriculum based problems as a cultural phenomenon in science education. We follow a group of four students who solve a biological problem, and study how different cultural tools at an institutional and disciplinary level together with the computer devices structure the students' problem solving interactions. Our aim is to identify improvements for how the knowledge domain can be productively fostered in the educational setting and identify possible implications for further designs of CSCL environments. The data are gathered from a design experiment in a secondary science classroom and video data are used to perform interaction

analysis. Our main finding is that the students, and their teacher, pursue the biological inquiry to solve the problem but not so much to make conceptual knowledge about the disciplinary field. The students employ scientific concepts but they do not relate these as part of a larger conceptual system. This is critical if conceptual reflections are wanted and not only procedural employment of isolated concepts. This affords clear efforts to improve different kinds of interventions that mutually stimulate interactions that support the students' making of scientific concepts in the educational setting, and that are taken care of as inscriptions in the CSCL environment. These inscriptions are important in the computer–based 3D model but it is even more decisive that these are taken care of as educational inscriptions on the website that is designed to support the 3D model. These inscriptions work as a starting point for organising the activities and direct the students in a wanted interpretation of the knowledge domain.

Technology-enriched learning environments – A potential to enhance learning: The students' perspective
Rivka Wadmany, Teachers College of Technology, *Israel*
Tamar Levin, Tel Aviv University, *Israel*

This study explored the characteristics of technology-enriched classroom environments and its potential to enhance both students' and teachers' growth that were reflected in the views of 164 4th-6th grades students on their longitudinal learning experiences in technology rich classroom environments. The main findings show that in almost all participating classrooms students' views were aligned with constructivist ideologies drawn on both social-dialogical learning and individual learning, and focused mainly on: authenticity, cognitive complexity, multiple perspectives, collaboration and personal as well as cognitive growth. The findings also indicated that students' perceptions of the learning environment in various classroom contexts differ significantly. These differences were also reflected in the constructivist characteristics of technology uses among the different classrooms. The findings further show the multi-dimensional nature of teachers' educational beliefs and reflect the complex nature of the relationship between students' views on their learning environments and teachers' educational beliefs and classroom practices.

Students' satisfaction with and perceptions of the added value of performing learning tasks in asynchronous online discussion and collaboration environments
Hossein Mahdizadeh, Wageningen University, *Netherlands*
Harm Biemans, Wageningen University, *Netherlands*
Martin Mulder, Wageningen University, *Netherlands*

The features of asynchronous online discussion and collaboration (AODC) environments are assumed to stimulate and facilitate processes of collaborative knowledge construction. A crucial question in this respect is how students perceive AODC environments. In the present study the following research questions were addressed: 1) Do students perceive added value of performing learning tasks in AODC environments?; 2) Are students satisfied with performing learning tasks in AODC environments?; and 3) What factors determine students' satisfaction with and perception of the added value of performing learning tasks in AODC environments? 148 BSc and MSc students from Wageningen University, who were enrolled in 7 different courses that included different AODC learning tasks, completed a questionnaire covering various student variables and the dependent variables. Our results showed that most students had either a positive or a neutral perception of the added value of performing learning tasks in AODC environments. The same held for their satisfaction with online collaboration. The determining factors identified in this study (students' previous experience with e-learning environments, their opinion about web-assisted

activities, their opinion about face to face collaborative team work, their opinion about e-learning, their perceived confidence and their perception of the ease of use of the environment) shed a light on the personal variables that should be taken into account while implementing AODC environments. In our opinion, the conclusion can be drawn that AODC environments can play an important role to foster learning because of their unique features that can reduce the disadvantages of face to face collaborative work.

B 19
28 August 2007 17:30 - 18:50
Room: 0.99
Paper Session

Educational technology

Chair: **Margarita Limon,** Universidad Autonoma de Madrid, *Spain*

Relating students' epistemological understanding of computer-based models with their reasoning during modeling
Patrick Sins, Utrecht University, *Netherlands*

While many educators and researchers in science have been arguing that students' epistemological understanding of models and modeling influences how they cognitively process a modeling task, there has been little evidence directly relating the two. Therefore, in this study students' level of epistemological understanding of models and modeling was examined as well as the relation between students' epistemological understanding and the level of their reasoning (i.e., deep versus surface reasoning) during modeling. Twenty-six students, working in dyads, were observed while working on a computer-based modeling task in the domain of physics. Students' epistemological understanding was assessed on four categories (i.e., nature of models, purposes of models, design and revision of models, and evaluation of models). Results indicate a significant relation between students' epistemological understanding and the level of their reasoning. From these results, we emphasize the necessity of considering epistemological issues in research as well as in educational practice.

Fact-oriented instructional design
Peter Bollen, University of Maastricht, *Netherlands*

In this paper we will show how fact-orientation can be used as a knowledge structuring approach for verbalizable knowledge domains, e.g. knowledge that is contained in articles, text books and instruction manuals further to be referred to as 'subject matter'. This article will illustrate the application of the fact-oriented approach as a subject matter structuring tool for a small part of the sub-domains of operations management and marketing within the university subject of business administration. We will also show that the fact-oriented modeling constructs allow us to structure knowledge on the first five levels of Bloom's taxonomy of educational objectives and we will show how the fact-oriented approach complies to the 4C/ID model for instructional design. Moreover, we will derive a 'knowledge structure metrics' model that can be empirically estimated and that can be used to estimate the complexity metric of a subject matter.

A study of students' experiences of technologies
Grainne Conole, Open University, *United Kingdom*
Maarten de Laat, Exeter University, *United Kingdom*
Teresa Dillon, Consultant, *United Kingdom*
Jonatrhan Darby, Open University, *United Kingdom*

The paper will report on a UK JISC-funded study looking at students' experience of the use of technologies in support their learning across different learning context, which has generated considerable interest in the research community in the UK. Details of the study and the context of the work as part of a wider programme are available from
http://www.jisc.ac.uk/elp_learneroutcomes.html

Breaking the Barriers: Why do the Teachers not use (more) ICT in their classrooms?
Péter Fehér, Eötvös University, *Hungary*

Breaking the Barriers: Why do the Teachers not use (more) ICT in their classrooms? The national „ICT in Education" programs have been developed just in every country in Europe (and other continents, too). Governments have made large financial for strenghtening the technical backgrounds and resources of the educational institutions (computers, internet-access, in-service training programmes for teachers, educational websites, etc.). But the recent reports show that the pedagogical breakthrough has not happened yet. In present paper we would like to summarize some results of the research about the situation of Hungarian teachers. The research has been started in autumn 2006 and the main objectives are the following: clearly identify those factors, which are the most important barriers to teachers need to face when they use (or want to use) ICT-tools in their everyday educational practice. Regarding facts (based more than 500 survey-questionnaires), we can conclude that most important issues are the following: lack of appropriate time for preparation for lectures, inappropriate knowledge (or practice) of computer applications, and poor foreign language skills. We found that the technical background of teachers and schools are not really problems at all. We hope that our research findings will provide important facts to teacher trainers and help them to develop more effective and useful training courses, training and support materials for teachers. This is a necessary premise for breaking the barriers and significantly improving the effective use of ICT in education.

B 20
28 August 2007 17:30 - 18:50
Room: 0.100B
Paper Session

Web-based learning

Chair: **Kirsti Lonka,** University of Helsinki, *Finland*

Clues to design and implement web-based activities in science to support inquiry-based learning
Ingrid Martorell, University of Lleida (UdL), *Spain*
Manoli Pifarre, University of Lleida (UdL), *Spain*
Susana Godia, University of Lleida (UdL), *Spain*

Science is a complex topic and educational research highlights the potential of the World Wide Web (WWW) as an instructional tool for classrooms. The development of pedagogical strategies suited to classroom use of online resources should be an important priority for the science education community. In addition, Inquiry has frequently been found to be more effective than traditional science instruction and scaffolds are a powerful tool to enhance learners understanding complex topics. The main goal of this study is to integrate technology and inquiry into science classrooms to assist students build their own knowledge and answer meaningful driving questions. A challenging instructional approach was designed, implemented, and evaluated with 127 students of secondary education. Specific scaffolds were provided to guide students in complex tasks, to help students develop scientific knowledge, and to provide supports that enable them to transfer what they have learned during the web-based activities. All activities were designed keeping in mind the WebQuest structure but also including the circular notion of inquiry process presented by Lim (2004). According to Lim (2004) an inquiry process has the next elements: Ask, Plan, Know, Explore, Construct, and Reflect. Quantitative assessments showed that students in the experimental group outperformed the ones in the control group in the post test ($t = -2{,}383$; $p = 0{,}019$), indicating the positive effect of the instructional design. A significant Pearson's correlation was found between pre and post tests for the experimental group ($r = 0{,}55$ with $p = 0{,}000$). Some clues to use adaptive scaffolds effectively were exposed. Some of these scaffolds are tables, simulators, applets, visualizations, conceptual maps, and taking notes spaces. From a qualitative point of view, Final Products in the experimental group showed a higher level of inquiry knowledge that those ones in the control group.

Students with learning disabilities in online courses: How do they fit?
Ilana Ronen, Kibbutzim College of Education, *Israel*
Miri Shonfeld, Kibbutzim College of Education, *Israel*

This paper is based on the findings of a four-year study and examines the suitability of a science education online course for students with learning disabilities (LD) in comparison to `regular` students without learning disabilities. The online course, which is mainly an asynchronous one, is based on workshops, labs, and leads to the central objective of guiding the students in developing a science unit independently. Pre- and Post-questionnaires were conducted to test the online course's contribution to the students` learning, and to their satisfaction with various components of the course. The grades and participation in the course of the LD students were compared to those of the `regular` students. The results point to the success of LD students in comparison to regular students and to higher satisfaction from the course on the part of the LD students. The LD students

presented independent learning abilities, time management skills, participation in discussion, and effective interaction with students and lectures. The lecture will demonstrate the quantitative results and consider the various possibilities of integrating LD students in online courses.

Trust and collaboration in Web-based environments
Hannele Niemi, University of Helsinki, *Finland*
Päivi Virtanen, University of Helsinki, *Finland*
Anne Nevgi, University of Helsinki, *Finland*

The aim of the study is to explore the meaning of trust in collaborative processes, especially in web-based learning environments in higher education. The theoretical framework is based on socio-constructive theories. Theoretical concepts of metacognition and self-regulation of learning are also applied to collaborative processes. The data collecting methods are complementary using both quantitative and qualitative methods. The data have been collected in several user groups of higher education students The Web-based tool IQ Team have been used as a data collection tool and environment. It provides three self-assessment test sets to evaluate group processes. The results reveal that trustful atmosphere is highly related to positive group processes and knowledge creation. The trustful atmosphere correlates strongest with innovation and creativity and with power of collaboration. Innovations in the group and creativity have a strong relationship with it how group members' differences are seen as resource. Innovations are borne when conflicting ideas are presented in positive and trustful atmosphere. The trustful atmosphere correlated negatively with rejecting group and avoiding group roles, and positively with encouraging and sharing know-how group roles. Trustful atmosphere is also related positively to collaborative interdependence. Importance of the study is reflected from the perspective of the theoretical frame and different user groups. Working in on-line groups requires trust in collective actions. Sharing expertise and creating knowledge in a group is a continuous reflective process, in which members must be aware of their roles, tasks, and how to monitor the work in a strategic way. The IQ Team aims at advancing successful learning environments where group members can learn about their own group and team members. The study provides co-operative tools and validated tests for higher education and further research. The results urge to promote trustful atmosphere in joint learning processes.

Augmented group awareness tools for supporting collaborative learning
Daniel Bodemer, University of Tübingen, *Germany*
Jürgen Buder, University of Tübingen, *Germany*

Group awareness tools usually refer to information about the group and its members that would be easily available in face-to-face settings, such as who is there, where other persons are located, where they are looking at, and what they are doing. However, the focus of our own research is on so-called augmented group awareness tools that are designed to provide information about entities that actually surpass face-to-face levels to some degree. The tools are applied to the field of computer-supported collaborative learning (CSCL) in order to implicitly structure collaborative learning processes. A prototypical tool is introduced, which is intended to support online learning groups by indicating group conflicts. It is based on user ratings of agreement and novelty of contributions, which are transformed and visualized as a feedback to the group. An experimental study (N = 64) investigated the influence of this prototype on controversial online discussions and decisions made by 4-person learner groups. The study employed an informed minority paradigm where one group member holds a correct viewpoint, but is faced with a 3-person majority holding an incorrect viewpoint. It was shown that majority influence occurred in unsupported groups,

which were provided with a standard online discussion tool. In contrast, augmented group awareness tools strengthened minority influence, as indicated by group decisions and individual correctness of decisions.

B 21
28 August 2007 17:30 - 18:50
Room: 3.67 Békésy
Paper Session

Training and development

Chair: **Roger Säljö,** Göteborg University, *Sweden*

A road map leading to a strong awareness of the learning process with teachers involved in implementing learning strategies in classrooms
Gerhard Steiner, University of Basel, *Switzerland*
Astrid Elke, University of Basel, *Switzerland*
Sandra Grieder, University of Basel, *Switzerland*
Corinne Tiaden, University of Basel, *Switzerland*
Heidi Steiner, University of Basel, *Switzerland*

Teachers involved in longitudinal intervention studies for implementing cognitive and meta-cognitive learning strategies in classrooms showed an extreme content orientation in teaching, striving mainly at fulfilling the curricular requirements with their students and lacking a definite focus on strategy implementation. A road map was developed to complement this content orientation of learning with a process oriented awareness of learning since strategy implementation requires the teachers? High familiarity with the underlying learning processes to be regulated by strategies. 62 teachers (10th through 12th grades) went through several specific steps aimed at creating a deep awareness of the learning processes and at consolidating the correspondingly acquired knowledge of the learning process and its strategic regulation: (a) In a three-day kick-off workshop the teachers were challenged to consciously experience and reflect on their own learning processes while dealing with difficult learning tasks (e.g. interpreting difficulties in understanding or storing of information), (b) to observe the corresponding processes amongst their students during a two-month period, (c) in another five workshops to acquire new knowledge about the learning processes and their strategic regulation by processing relevant theoretical background information in order to be able, finally, to introduce cognitive and meta-cognitive strategies in their classrooms. The teachers' growing awareness of the learning process was measured over the whole workshop period (eight months) by means of qualitative and quantitative data from the reports on their own specific learning processes while dealing with specific learning tasks during the workshops. Differential patterns in the results seem to correspond with levels of teacher's qualification and learning orientation.

An evaluation of accredited teacher training programmes in UK higher education
Andria Hanbury, The Higher Education Academy, *United Kingdom*
Michael Prosser, The Higher Education Academy, *United Kingdom*

In the UK, government policy requires that, from the current academic year, all new academics in higher education should complete an appropriate teacher training programme. These programmes are accredited by the Higher Education Academy and aim, in part, to develop more student-centred or focussed teaching. A common theoretical underpinning of such programmes is derived from the research on the presage-process-product model of student learning, with associations found between teachers' adopting a student-centred approach to teaching and their students adopting a deep approach to learning, and with students adopting a deep approach and achieving better learning outcomes. The aim of this research was to compare academics' conceptions of teaching before and after attending an accredited programme, and to explore their evaluations of the quality of the programmes. Academics from 32 UK institutions who had recently completed a programme were surveyed, with a response rate of 46 percent [N=388]. The academics rated themselves as significantly more student-centred and significantly less teacher-centred after attending a programme. Overall, those who experienced the highest increase towards a student-centred approach also evaluated the programmes most highly. Participants from post 1992 institutions, and from health sciences disciplines, reported the biggest increase towards a student-centred approach and evaluated the programmes most positively. Participants were most dissatisfied with the work load and the balance between generic and discipline specific support provided by the programmes. The findings suggest that the programmes can be successful in helping participants become more student-focussed and improve the quality of their teaching. The findings also highlight areas for future development of the programmes, including exploring the balance of generic versus discipline specific aspects of the programmes, and the demands the programmes place upon new academic staff.

Hindrances for a virtual teacher community to become a learning community
Anastasios Matos, University of Thessaly, *Greece*
Vassileios Kollias, University of Thessaly, *Greece*

This paper describes and analyses the forty months life of a web environment, constructed by the Centre of the Greek Language (C.G.L.), in order to support a CoP comprised by teachers of Greek, in Universities around the world. It was expected that conditions under which this group was functioning (generic virtual environment with affordances to communication and cooperation, isolated teachers without colleagues' help by them, having to cope with special curricular issues), would be conductive to the emergence of a learning community culture, and could possibly have a broader impact in changing teachers' attitudes to jointly constructing knowledge. Analysis of the written exchanges in the asynchronous data base shows that the first year of their operation was characterized by a separation of the participating members in two groups (a "core" of high participation and a periphery of much less active members). Many of the participants exchange individually made activities, without any joint creation of common activities. The sparse efforts to start joint teaching material creation or to discus about pedagogical issues faltered. Efforts by the mediators of the community to "raise the standards", by explicitly calling the members to participate in "Electronic Workshops" under the guidance of experts, met a lot of resistance, overt or covert from the members themselves, and finally faltered too. Analysis of the data base contents, denotes three main issues that are relevant to the lack of a disruptive change: a) participants did not lead their team towards the adequate discussion of some important issues (in accordance to their familiar work norms) b) a lack of orientation towards inquiry learning in the

specific academic domain in the initial formative phase c) community life was affected by the participants' professional predilection to act individually, without seeking help from colleagues.

Age differences in self-directed work-related learning competency
Christian Rossnagel, International University Bremen, *Germany*

Self-directed learning is an important ingredient of informal workplace learning, the importance of which has grown markedly since the 1990s. Little is known, however, about the competencies underlying successful self-directed learning, and how they change across work life. The relationship between learning, control and self-regulation strategies is likely to be hierarchical: a deficit in learning strategies may be compensated by appropriate control strategies, whereas insufficient control or regulation strategies will adversely affect learning even if a person's learning strategies repertoire is complete. Thus I hypothesised that age differences in workplace learning will be a function of differences in self-regulation strategies, rather than in learning strategies. In an on-line survey of three age groups (young, 18-35yrs, middle-aged, 36-50yrs and older, 51-65yrs) of workers, 300 participants rated their most recent episodes of workplace learning for how well self-set learning goals had been attained and for contributing personal and organizational factors. In addition, several measures of individual learning, control and self-regulation strategies were administered. Independent of age and education, successful learners scored higher on approach-performance-approach goal orientation and work-related self-efficacy, which was significantly correlated with epistemological malleability beliefs. Unsuccessful learners did not differ in their learning strategies, but had lower control strategies scores, and reported higher cognitive load. A pronounced age effect was found for negative affect which increased for both successful and unsuccessful learners, and was coupled with a marked decline in self-efficacy for unsuccessful learners. Cognitive load showed significantly less increase in both groups. Findings provide first starting points for age-differentiated Human Resource development methods in the workplace learning domain.

B 22
28 August 2007 17:30 - 18:50
Room: 0.100D
Paper Session

Self-regulation

Chair: **Alexander E. M. G. Minnaert,** Rijksuniversiteit Groningen, *Netherlands*

Does using logbooks foster self-monitoring in university students?
Sabine Fabriz, University of Frankfurt, *Germany*
Charlotte Dignath, University of Frankfurt, *Germany*
Gregory Poarch, University of Frankfurt, *Germany*
Gerhard Büttner, University of Frankfurt, *Germany*

Research on metacognition and self-regulated learning has revealed the impact of metacognitive strategy use on the efficiency of learning. Learning independently and being able to evaluate the own learning process is of primary significance, especially in university students. Providing students with the opportunity to self-monitor their learning behaviour is one possible way to

enhance self-regulated learning. Within the scope of an intervention study on fostering self-regulation amongst university students (N=79), learning strategy use should be improved by keeping weekly, standardized logbooks about students' employ of motivational and metacognitive strategies. Two groups from different university courses completed the logbooks on a weekly basis, one group attending courses on self-regulated learning, the other group attending courses in English grammar. Each group was assigned a control group of the same course type without logbooks. Learning behaviour, especially the use of metacognitive strategies, was assessed in a pre-post evaluation design by means of a self-report questionnaire on strategy use. Additionally, the analyses of the standardized logbooks permitted process-related assessment of state variables. The pre-post-evaluation revealed that keeping logbooks improved strategy use for those students who attended a course on self-regulated learning; journalizing without further instruction on self-regulation could not enhance learning behaviour. Results will be discussed considering motivational and situational aspects.

Framework of teacher-learner autonomy, which is linked to learner autonomy: integrating theory and practice to promote teacher-learner autonomy in teacher education practices
Ayse Yumuk Sengul, Bilkent University, *Turkey*

This study aims to promote a change in the perceptions of trainee teachers in terms of teacher autonomy, learner autonomy, and the interrelation between the two by designing and implementing a framework of teacher-learner autonomy, which is linked to learner autonomy, in a teacher education course. The framework designed and implemented integrates theory and practices concerning four areas of metacognitive awareness: learner awareness, learning process awareness, social awareness and subject matter awareness, with an underlying principle that teacher as learner engagement in and reflection on the four areas of metacognitive awareness is crucial in teacher development practices for self-directed professional learning and development as well as pedagogical awareness of learner autonomy in language learning. Data were collected from fourteen trainee teachers in a first-semester methodology course in a teacher development program at a university in Turkey through pre- and post-course questionnaires, post-course interviews and e-learning journals. The results revealed a significant change in the perceptions of trainee teachers, in that their own involvement in and reflection on both theory and practice concerning four areas of metacognitive awareness encouraged them to self-direct their professional learning and development. They were further able to link their self-directed professional learning experience to pedagogical awareness for learner autonomy.

Using learning strategies in a virtual learning environment at university
Melanie Germ, University of Munich, Department of Psychology, *Germany*
Heinz Mandl, University of Munich, Department of Psychology, *Germany*

The aim of this field study was to identify major cognitive, metacognitive and resource-related strategies applied by students during the process of self-regulated web-based learning in a virtual learning environment at university. The focus was set on a situational inquiry of learning strategies. Furthermore, the study aimed at finding results about motivational factors of strategy use on the one hand and the effectiveness of the strategy use for the learning outcome on the other hand. The inquiry was done before and after the self-regulated work in a virtual, text-based learning module by students. The results of the inquiry show that particularly cognitive elaboration strategies and strategies of regulating and monitoring the learning process were used in the virtual learning environment. According to the findings the management of effort and attention played a major role in the learning process. Moreover, the findings clearly point to the fact that it is

particularly the motivation in the learning process which is important for motivation in the learning process being important for the elaboration of the learning content, the regulation and monitoring of the learning process and the management of attention. The regulation of the learning process shows a significant correlation with learning achievement. In the face of the results of this study, the following suggestions can be made for designing virtual learning environments: When designing a virtual learning environment measures contributing to reducing managing effort and attention are to be taken. Furthermore, virtual learning environments are to be designed in a way that the learner's motivation is fostered.

Momentary adaptation of self-regulation strategies under situational stress during problem-solving

Julia Eksner, Northwestern University, *USA*

Aim: The selection of self-regulatory strategies is conceptualized as depending on situational demands and individuals' perceived resources for responding to these demands. The aim of this study is to investigate the extent to which self-regulatory strategies, and emotional response, change in response to situational stress demands (Trier Social Stress Test) induced during problem-solving. The analysis further investigates if momentary change in self-regulation strategies in response to a stress condition during problem-solving is different for participants with high or low experiences of context stress and social support. Hypothesis: All participants are predicted to experience a significant change in momentary affect and self-regulatory strategies in response to the stress condition. The experience of high context stress is hypothesized to lead to a higher negative emotional response (lonely/angry, stress/anxiety) to the stress condition and selection of more maladaptive (optimization, compensation) and less adaptive (goal termination) self-regulatory strategies. Methods: Study participants were immigrant public high school students (15 male, 22 female) aged 14-19 years. Survey data on participants' stress experiences (life, neighborhood, acculturation, and racialization stress) was collected. During a quasi-experimental task subjects' self-regulation, hormonal stress levels, and momentary affect during an ecological problem solving task was assessed. Findings support the hypothesis as all participants reported significantly higher negative affect and more maladaptive goal-termination strategies. Further, participants with experiences of high context stress reacted with significantly more negative affect that those without. There are some findings, which can be interpreted as signs for a potential role of context stress in an increase in maladaptive self-regulatory strategies in response to the stressor. However, the hypothesis was not supported as these findings are weak at this point, and will need further investigation.

B 23
28 August 2007 17:30 - 18:50
Room: -1.63
Paper Session

Technology and innovation

Chair: **Brigitte Rollett,** University of Vienna, *Austria*

Primary teachers' concerns about implementing educational standards in Germany – associations with student achievement
Hans Anand Pant, Humboldt-University Berlin, *Germany*
Claudia Pöhlmann, Humboldt-University Berlin, *Germany*

As a consequence of the enactment of National Educational Standards (NES) for core school subjects in 2003, all sixteen Federal States in Germany are bound to implement the NES through state law. Besides the development of NES-based national performance scales the NES documents recommend a system-wide implementation strategy, including streamlining of curricula and the implementation and evaluation of standards-based classroom instruction. This study describes how, at the early stages of a nationwide educational reform, primary school teachers are concerned with this innovation and how their concerns are related to student achievement in their classes. In order to assess the level of primary teachers' concerns we adopted the Stages of Concern (SoC) 35-item questionnaire (Hall & Hord, 2006). The nationally representative sample of N=1,123 primary school teachers of mathematics and German was part of a larger field trial evaluating the psychometric properties of the NES-based proficiency scales in some 18,000 third- and fourth-graders in spring 2006. Data analyses include an evaluation of the reliability and construct validity of the SoC questionnaire, cluster analysis to detect homogenously profiled subgroups, and a multilevel analysis to test for effects of teachers' SoC profile on student achievement. Cluster analysis resulted in distinct SoC profile groups, and provisional analysis revealed that a combination of a high profile on personal concerns and a low profile on cooperation is associated with lower student achievement levels controlling for other student variables. Consequences are discussed in terms of unfair "head start effects", as well as in terms of limitations arising from the hitherto correlational nature of the data.

Fostering 6-8 year-old students' inductive reasoning
Gyöngyvér Molnár, University of Szeged, *Hungary*

This paper presents a developmental training program of inductive reasoning for first and second grade students and the results of the first evaluation study. The training is based on Klauer's theory of inductive reasoning and the concept of the German program 'Cognitive training for children' (Klauer, 1989). Klauer's original program consists of 120 problems, which can be solved by inductive reasoning. Preserving the structural aspects of the tasks, the tools of the training exercises were significantly enhanced to correspond to the age of the cohort targeted. One-quarter of the tasks are manipulative (they need colorful building blocks, Dienes's logical set, matches, etc.). In the experimental and control groups of the study 53 and 67 low-SES students were involved, respectively. For the pre- and posttest of the study an inductive reasoning test was used, consisting of 33 figural, nonverbal items (Cronbach-a=0.86). On the average, the experimental group outperformed the control group on the posttest significantly, by nearly two standard deviations. The experimental group scored significantly higher on every ability for which training

was provided (generalization, discrimination, cross-classification, recognizing relations, discriminating relations and system formation). The most noticeable development (35%) was found in system formation. No gender differences were found nor on the pre-, or the posttest. The effect size of the training program is d=0.95. This study revealed evidence that inductive reasoning can be developed at a young age very efficiently. It is the most important thinking skill in knowledge acquisition and knowledge application, in that these skills play a role in a broad range of learning activities.

Analogical rasoning training in children with moderate mental retardation
Fredi Büchel, Geneva University, FPSE, *Switzerland*

Analogical reasoning is a central part of intelligence and a prerequisite for the transfer of learning. Many research studies have demonstrated the possibility of training mentally retarded students successfully in analogical reasoning. Most research in analogical training with mentally retarded persons has been realized by a classical experimental design. Children are assigned to an experimental group with analogical training or to a control group without training. The training is given by a researcher who is not the regular teacher of these children. This kind of experimental intervention has some well-known disadvantages in children with moderate mental retardation. These students need often a rather long period to accept a new teacher. Further, the experimenter is not familiar with all the individual differences concerning cognitive and emotional characteristics of the children. We therefore decided to realize an interventional research study executed by the regular teacher. Her regular special education class (n = 5) participated as EG1. This group profited from an extended analogical training during the whole school year. Seven children of the same MA but without mental retardation participated as MA-control. They got a short training. The CG without training consisted of nine mentally retarded children of the same analogical reasoning level. In a first hypothesis we postulated that given extended training during the whole school year, students with moderate mental retardation would acquire analogical reasoning skills, and transfer them to new domains. The second hypothesis stated that the EG1 children would outperform the MA-control group in the posttest because of their longer and more integrated training. Results confirm both hypotheses with respect to learning but not to transfer. Discussion will focus on the learning-transfer-hypothesis formulated by the Campione-Brown laboratory.

Learning scenarios for the use of educational technologies in primary school: an exploratory study
Monica Macedo-Rouet, University of Poitiers, *France*
Cedric Couvrat, University of Poitiers, *France*
Emilie Besneville, University of Poitiers, *France*
Jean-Michel Perron, Centre National de Documentation Pedagogique, *France*

The present study describes the characteristics of ICT-based learning scenarios from a French national database for primary schools. The goal is to understand how teachers communicate their practices and whether scenarios are useful to them. Dimensions of 364 learning scenarios were identified through content analysis, while teachers' perceptions were collected via standardized interviews by telephone. Most scenarios targeted years 6-8 of French primary school and language disciplines. The activities most frequently cited involve: editing multimedia documents, using the interactive whiteboard, editing text with software and using edutainment software. More than half of the teachers interviewed find the scenarios useful to get ideas for the class. But the scenario database is judged less useful than search engines to find documents on the Internet.

C 1
29 August 2007 08:30 - 10:30
Room: Konferencia
EARLI Invited Symposium

Construction of mathematical knowledge: new conceptual and methodological developments

Chair: **Lieven Verschaffel,** Katholieke Universiteit Leuven, *Belgium*
Organiser: **Lieven Verschaffel,** Katholieke Universiteit Leuven, *Belgium*
Discussant: **Brian Greer,** University of Portland, *USA*
Discussant: **Andreas Demetriou,** University of Cyprus, *Cyprus*

Development in the domain of mathematics from birth through the end of adolescence generates increasingly more complex, abstract, and rule-governed concepts, and more versatile, flexible, and planfull problem solving skills (Demetriou, 2006). Nothwithstanding major work done by developmental psychologists and mathematics educators like Baroody and Dowker (2003), Hiebert (1986), Rittle-Johnson and Siegler (1998), Star (2005), and many others, the respective roles of procedural and conceptual knowledge in students' learning of mathematics continues to be a topic of animated debate. Recent theoretical and methodological developments, with important implications for both research and practice, have led to new approaches to this topical issue. Compared to previous research, this recent work is characterized, first, by a greater reliance to longitudinal and intervention methods that seriously take into account the impact of people's instructional histories and, second, by the use of more advanced and sophisticated methods and techniques for data gathering and data analysis The present symposium comprises four papers of original research programmes addressing the above pivotal issue, followed by two discussion papers, one by a developmental psychologist and one by a mathematics educator.

Children's understanding and use of the inverse relation between addition and subtraction.
Peter Bryant, University of Oxford, *United Kingdom*
Terezinha Nunes, University of Oxford, *United Kingdom*

Research on the understanding of the inverse relation between addition and subtraction has concentrated, almost entirely, on the procedural question of the "short-cut strategy". This research deals with the extent to which children are able to solve a+b-b problems rapidly and correctly without having to calculate. However, the underlying development which leads to this insight has been rather neglected. We shall report studies which show that a crucial change in children's understanding of the inverse relation takes place in the pre-school years. At this time many children progress from understanding the inversion of identity (if you add some stuff to an object and then take the same stuff away, you restore the status quo) to understanding the inversion of quantity (if you add 3 items to a set, and then take 3 different items away from it, the number of items in the set is as it was in the first place). We shall also show that children's understanding of inversion at this time is not restricted to exact cancellation: they are as likely to judge correctly that a+b-c=>a when b>c as that a+b-b=a. During the pre-school period there are large individual variations among children in their success with inversion problems, and our evidence suggests that these persist into the school years. We shall argue that there is a link between the strength of children's underlying understanding of the inverse addition-subtraction relation and their ability to adopt "short-cut" inversion procedures.

Solving subtraction problems flexibly by means of indirect addition
Lieven Verschaffel, Katholieke Universiteit Leuven, *Belgium*
Joke Torbeyns, Katholieke Universiteit Leuven, *Belgium*
Lien Vanderveken, Katholieke Universiteit Leuven, *Belgium*

This paper deals with an aspect of the inverse relation between addition and subtraction that has received little research attention so far, namely the extent to which people are able to solve adaptively subtraction problems of the type a-b=. by means of indirect addition strategies ("how much do I have to add to b to get at a?"). After a review of the relevant math educational literature wherein a strong plea is made for the teaching and learning of this indirect addition strategy for solving small-difference subtraction problems like 21-18=. or 2012-1988=., we will report three recent studies done at our centre. In a first study adults were asked to solve three-digit subtractions with a small difference between the integers (e.g., 812-786=.) using the choice/no-choice method. Many adults were found to spontaneously apply the indirect addition strategy and to use it in a rather efficient and adaptive way. In a second study, 2nd to 4th graders solved small-difference subtractions up to 100 in two conditions: in the first condition, they could use their preferential strategy on each item; in the second condition, they were instructed to report at least one alternative strategy for solving each item. Generally speaking, children did not spontaneously apply indirect addition, but also could not generate it as an alternative solution method when explicitly asked for an alternative method. In a third study we compared the strategic performance on subtractions with small differences up to 100 of 2nd to 4th graders from regular classes with that of children from a school wherein the clever use of indirect addition got ample instructional attention. Although the children from the latter school generated somewhat more indirect addition strategies, the number of indirect additions remained remarkably low. Finally, we discuss theoretical and educational implications of our work.

Causal relations between children's conceptual and procedural knowledge about a mathematics problem: Two experiments
Michel Schneider, Institute for Behavioral Sciences, ETH Zurich, *Switzerland*
Elsbeth Stern, Institute for Behavioral Sciences, ETH Zurich, *Switzerland*

Conceptual knowledge gives humans a deep and abstract understanding of general relations in a domain while procedural knowledge enables them to quickly and efficiently solve problems. Cognitive learning theories provide contradicting predictions as to the causal relations between conceptual and procedural knowledge in the course of knowledge acquisition: These relations are assumed to be either none-existent, or bi-directional, or uni-directional. To date, the empirical evidence for each of these hypotheses is quite rare and weak. In two experimental studies, we tried (1) to derive treatments adequate for influencing students' conceptual and procedural knowledge about decimal fractions independently of each other and (2) to investigate whether an experimentally induced increase in one knowledge kind will subsequently lead to an increase in the other knowledge kind. The treatment for improving conceptual knowledge was derived from theories of conceptual change, while the treatment for improving procedural knowledge was based on theories of skill acquisition. To evaluate the breadth of the treatment effects, four typical measures of each knowledge kind were used. The samples of the two studies comprised a total of about 170 fifth-graders. Contrary to our expectations, the two treatments failed to show an at least partly independent influence on conceptual and procedural knowledge. So the causal interrelations of both knowledge kinds could not be investigated. The findings were consistent over the two studies as well as over the eight knowledge measures and confirm previous findings obtained with structural equation models. In sum, the results show that the conceptual and the procedural

knowledge about relatively simple mathematics problems are so closely intertwined that distinguishing between them is of limited practical value. However, the generalizability of these findings is unclear and should be the subject of further research. Implications for cognitive learning theories, for educational practice, and for future studies are discussed.

Contrasting cases in mathematics lessons support: Procedural flexibility and conceptual knowledge
Jon Star, Harvard University, *USA*
Bethany Rittle-Johnson, Vanderbilt University, *USA*

Encouraging students to share and compare solution methods is a key component of reform efforts in mathematics in many countries, but experimental studies that more conclusively demonstrate the benefits of sharing and comparing ideas for student learning are largely absent. In a series of studies, we experimentally evaluated a potentially pivotal component of this instructional approach that is supported by basic research in cognitive science: the value of students comparing multiple solution methods. Our investigations focused on 10-12 year olds studying computational estimation (e.g., mentally estimating the product of 23 * 57) and 13-14 year olds studying algebra linear equation solving (e.g., solving equations such as 3(x + 1) = 12). In all studies, students learned the mathematical content in one of two conditions (assigned randomly): 1) comparing and contrasting alternative solution methods (i.e. contrasting cases), where two worked examples were presented on the same page, accompanied by two reflection questions that asked students to compare and contrast the two worked examples; or 2) reflecting on the same solution methods one at a time, where the same worked examples were presented on two separate pages, with a single reflection question focusing on only one worked example on each page. In both conditions, students worked with a partner in their regular mathematics classrooms to study and explain worked examples. Our results indicate that students in the contrasting cases group were more accurate in their performance on procedural knowledge items (including transfer items), showed greater procedural flexibility, and also showed comparable gains in conceptual knowledge. In particular, comparison seemed to facilitate attention to and adoption of non-conventional methods. These findings suggest potential mechanisms behind the benefits of comparing contrasting solutions and ways to support effective comparison in the classroom. Overall, it seems to pay to compare.

C 2
29 August 2007 08:30 - 10:30
Room: 0.59
SIG Invited Symposium

Reflections on the "first principles of instruction"

Chair: **Tamara van Gog,** OUNL, *Netherlands*
Organiser: **Jan Elen,** Universiteit Leuven, *Belgium*
Discussant: **Jeroen van Merriënboer,** OUNL, *Netherlands*

Based on a study of a variety of instructional design theories and models, Merrill (2002) puts forward five ‘first principles of instruction’ which uphold that learning is promoted when: 1. learners are engaged in solving real-world problems, 2. existing knowledge is activated as a

foundation for new knowledge, 3. new knowledge is demonstrated to the learner, 4. new knowledge is applied by the learner and, 5. new knowledge is integrated into the learner's world. According to these principles, good instructional materials should consist of prior knowledge activation strategies (principle 2), (modelling) examples/demonstrations (principle 3), and practice of realistic learning tasks (principle 1 and 4) in a realistic context (principle 5). This symposium questions the value of a search for basic principles of instructional design and, more in particular, the five first principles of Merrill. Questions to be answered include: Are important principles missing? Are some principles superfluous? Does the listing of principles makes any sense or should we be looking at integrated sets of principles? Is the effectiveness of principles not actually mediated by learner-related characteristics such as expertise? And, last but not least, are first principles of instruction helpful to the field of instructional design or should we take another route? Merrill, M. D. (2002). First principles of instruction. Educational Technology Research and Development, 50, 43-59.

Merrill's "first principles of instruction" contribution of the principles to the field of instructional design
Joost Lowyck, Universiteit Leuven, *Belgium*

The basic problem of instructional design is how to link developments in learning and instruction to principles of designing education. Depending on the view on a learning environment, instruction-driven versus learner-driven parameters can be distinguished. In a tradition where instruction is the main paradigm ('instructional' design) it is expected that both quality and effectiveness of learning environments depend on instructional endeavours. Instructional designers build environments taking into account expected effectiveness principles that are highly dependent on the learning paradigm they adopt. In the 'learning design' paradigm, learners do not only play a leading role in their adaptation to the already designed learning environment but they are designers or co-designers of their own environment. Evidently, in more open and learner-directed environments, more is needed than instructional principles. Mental models and skills of learners in designing environments are needed as well. This is exemplified by the concept of 'learner communities' that, in their functioning, require more than instructional design principles.

Merrill's five first principles in The Sparkling School
Jos Beishuizen, Educational Centre VU, *Netherlands*

In this contribution, Merrill's five first principles of education will be applied on a project, The Sparkling School, in which students, teachers, and researchers collaborate in a community of learners fostering the development of inquiry skills and subject-matter knowledge. The role of this learning environment as a testbed for student-teachers will be explored.

Principles of instruction: a multimedia-learning perspective
Detlev Leutner, Duisburg-Essen University, *Germany*

Without a comprehensive framework for a theory of learning and instruction, and without empirical evidence for that theory, principles of instruction are "pedagogical folklore". In this contribution to the symposium, David Merrill's "first principles of instruction" are reviewed against the background of a growing body of sound research on learning with multimedia. It is asked whether Merrill's principles are in line with "multimedia learning principles" and whether recent empirical evidence that questions the generalizability of some of these principles - across

different domains of learning and across different types of learners - might question the search for instructional "principles" in general.

The first principles: Conclusions and discussion
Jeroen van Merriënboer, OUNL, *Netherlands*

In the final presentation of this symposium the presenter's answers to the following questions are synthesized: Are important principles missing? Are some principles superfluous? Does the listing of principles makes any sense or should we be looking at integrated sets of principles? Is the effectiveness of principles not actually mediated by learner-related characteristics such as expertise? And, last but not least, are first principles of instruction helpful to the field of instructional design or should we take another route?

C 3
29 August 2007 08:30 - 10:30
Room: 0.87 Marx
SIG Invited Symposium

Reading during writing

Chair: **Åsa Wengelin,** Lund University, *Sweden*
Organiser: **Åsa Wengelin,** Lund University, *Sweden*
Organiser: **Denis Alamargot,** University of Poitiers, *France*
Discussant: **Kris Spelman Miller,** University of Reading, *United Kingdom*
Discussant: **Marie Stevenson,** University of Sidney, *Australia*

Writing is a frequent and important activity in work life as well as in school and the importance of writing has probably increased with the use of computers. Some examples of typical writing activities in class are composing, answering questions and scoring/commenting on tests and student/peer papers. In order to improve the teaching of writing we need more knowledge about the cognitive processes that underlie text production. One important part of the writing process is reading. Students extract information from sources in order to compose a paper, they read the questions of a test and they read other students' papers during peer review sessions. Teachers undertake similar reading activities while for example reading and scoring students' papers and tests. However, students and teachers do not only read texts written by others. They reread their own compositions, test answers and comments in order to edit and improve them but also in order to continue their writing in a coherent way. In this symposium we will focus on the process of "reading during writing". All papers in the symposium have used eye-tracking in combination with different methods of recording writing in order to investigate where readers look when they perform different writing tasks. Torrance and Galbraith investigate the reading behaviour of university students who are composing argumentative texts. Johansson et al compare reading and writing behaviours of keyboard gazers and monitor gazers. Alamargot et al investigate the process of writing from sources. Quinlan et al study sentence composing and error detection during proof reading. Finally, Solheim and Uppstad have investigated the process of students' reading while answering test questions.

EyeWrite: automatically coding fixation location during text production
Mark Torrance, Staffordshire University, *United Kingdom*
David Galbraith, Staffordshire University, *United Kingdom*

Meaningful analysis of the focus of writers' gaze within their text is problematic because the text that the writer is looking at is continually changing in unpredictable ways. Methods used in reading research that require definition of fixed areas of interest are, therefore, of no use. However, manual coding from a playback of the writing session with a gaze-location overlay is impracticably time consuming. EyeWrite editing and analysis software locates fixations in the text rather than as screen coordinates, and therefore allows measurement of the distance (in characters, words, sentences, paragraphs) between the last-inserted character and current fixation. We believe that these kinds of measurement are key to understanding reading-during-writing. In our paper we will present a summary of the functionality of EyeWrite. We will then present a preliminary description of the main features of writers' reading behaviour based on a sample of 10 undergraduate psychology students writing short argumentative essays.

Gazing at the keyboard or the monitor: Two different strategies in text production
Roger Johansson, Lund University, *Sweden*
Åsa Wengelin, Lund University, *Sweden*
Victoria Johansson, Lund University, *Sweden*
Kenneth Holmqvist, Lund University, *Sweden*

If the translation processes during writing operate fluently, they draw little on the limited working memory processes, something that provides the writer with more resources for planning and revision. And when it comes to computer writing, an important aspect of translation fluency is typing skills. It has for example been shown that fast typists make fewer and shorter pauses than slow typists and have longer and more productive execution-periods. It is generally assumed that a skilled typist uses all her fingers and looks at the monitor most of the time while less skilled typists are supposed to look more at the keyboard.In this paper we compare different aspects of the writing process of "monitor-gazers" and "keyboard-gazers". One group of 15-year olds (N=20) and one group of university students (N=20) took part in the study. Equipped with an eye tracker all subjects wrote an expository text in a keystroke logging program on a computer. Based on the distribution of where the subjects looked during the text production they were categorized as either monitor-gazers or keyboard-gazers. The results indicate that the elder and thereby more advanced readers and writers tend to be "monitor-gazers", that monitor-gazers looks at the keyboard in very brief intervals, and that keyboard-gazers looks at the monitor and keyboard in a similar manner. Monitor-gazers write significantly faster and make significantly more keystrokes but do not produce longer texts. This indicates that monitor-gazers edit their texts more than the keyboard-gazers. One possible explanation for this could be that by continuously monitor their writing, the monitor gazers get a better overview of their texts and therefore better possibilities to edit their texts. Text quality, reading patterns, editing patterns and detailed analyses of fixations and saccades are currently being analysed.

Writers juggling error-detecting with sentence composing: Influences of cognitive load and error-type
Thomas Quinlan, Educational Testing Service, *USA*
Maaike Loncke, University of Ghent, *Belgium*
Marielle Leijten, University of Antwerp, *Belgium*
Luuk Van Waes, University of Antwerp, *Belgium*

In the following two experiments, we examined proofreading in the context of sentence composing. We devised an experimental writing task in which participants corrected an embedded error (orthographic near-neighbors or far-neighbors) and completed a sentence (using 1 or 3 context words). Experiment 1 investigates how the cognitive demands of sentence composing influences proofreading performance. The results revealed that participants were more successful at (a) integrating 1 context word than 3 context words and (b) correcting far-neighbor errors than near-neighbor errors. In Experiment 2, we examine how sentence difficulty and error type influences the adoption of writing strategies. The results of Experiment 2 revealed that both error type and sentence complexity influenced the strategies of error-correcting. Participants most often (90% of the time) opted to complete the sentence before correcting the error. The eyetracking data revealed that error-type also influenced how participants coped with correcting errors. In the analysis of fixation transitions (into the error-zone), a significant main effect was revealed, with more transitions for near-neighbor errors than far-neighbor errors. This investigation reveals how the interplay of two factors, cognitive load and error-type, appears to influence how writers coordinate error-detecting with sentence composing.

K-means method to assess the visual strategy of the writer composing from sources
Denis Alamargot, University of Poitiers, *France*
Gilles Caporossi, HEC Montreal, *Canada*
David Chesnet, University of Poitiers, *France*
Christine Ros, University of Poitiers, *France*

Writing from sources is a frequent task at the workplace and its importance increases with the use of computers. This task requires a double competence in both reading-extracting information and inventing-composing text. The 'Eye and Pen' system was designed to study these skills. Based on a synchronous recording of eye movements (via an eye-tracking system) and pen movement (via a digitizing tablet), the device provides a fine-grained description of the visual strategies used by the writer while composing. To study these strategies, we recorded the graphomotor and eye activity of 25 adults while they were composing a procedural text by referring to documentary sources. From the visual patterns, some statistics are computed. One of them is the transition matrix indicating the frequency with which the eye moves from one zone to another zone. Other statistics such as the average number of different pieces of information explored when the eye leaves the writing zone are also considered. From these various statistics, a measure of dissimilarity between respondents is computed and clustering (K-means) is used to find groups of respondents with similar exploration patterns. The clustering results show that two groups of writers can be classified regarding their visual exploration activity. Further investigations show that these two groups also differ regarding their respective working memory capacity and age. We demonstrated that K-Means is relevant here to distinguish various visual strategies during writing and this K-Means categorization seems to be cognitively valid.

Students integration of text and illustration in an assessment of reading comprehension: relations between reading and reading while answering
Oddny Solheim, University of Stavanger, *Norway*
Per Henning Uppstad, University of Stavanger, *Norway*

The present study explores the idea that eye-tracking methodology can validate the intended function of items in a reading comprehension test, as suggested by Pearson & Hamm (2005). Eye-tracking methodology has been widely used for reading (Rayner, 1998), but largely ignored in educational assessment (Tai et al., 2006) and reading assessment. In eye-tracking studies one has usually studied the first reading of the text, and this reading behaviour has sometimes been to measures of reading comprehension (Hannus & Hyßnä, 1999; Hyßnä et al., 2002). As a consequence, the actual process of reading when answering has not been focused. Assessments of reading comprehension typically consist of reading passages accompanied by a set of multiple-choice and constructed response questions. The present study aims at both the reading of the text (condition 1) and the reading performed while the student is answering questions related to the text (condition 2). This kind of design opens up for the study of different strategies.

C 4
29 August 2007 08:30 - 10:30
Room: Harmónia
EARLI Invited Symposium

Socially constructed self-regulated learning: Strategic regulation of learning and motivation in soc

Chair: **Sanna Järvelä,** University of Oulu, *Finland*
Organiser: **Sanna Järvelä,** University of Oulu, *Finland*
Organiser: **Allyson Hadwin,** University of Victoria, *Canada*
Discussant: **Monique Boekaerts,** Leiden University, *Netherlands*

The nature and assumptions underlying self-regulation in learning (SRL) have been widely discussed (e.g. Winne, 1995; Zimmerman, 1989), and more recently, related to motivation and emotion in learning environments (e.g. Boekaerts & Corno, 2005). The theory's main topics concern how learners develop learning skills and how they can use learning skills effectively. Studying effectively by self-regulating learning is itself a skill powered by will, this is to say, directed and regulated by motivation. Although self-regulation research has traditionally focused on an individual perspective, there is an increasing interest in considering these processes at the social level with reference to concepts such as social regulation, shared regulation or co-regulation. Conceptualizing SRL as a dual psychological-social phenomenon calls for the integration of SRL, as an individual psychological concept, within the social, shared and interactive processes of learning. Such an approach is critical for understanding productive engagement and participation in real-life social learning environments. Despite the centrality of social context in models of SRL, a need has emerged to become clearer in: (a) explaining precisely the role of social and contextual influences on variety of phases of SRL, (b) exploring the critical phases of self and social in the strategic regulation of learning, and (c) developing more precise language to describe what we mean by social in theory and empirical research about SRL. Papers in this symposium share the common goal of grappling with the social nature of self-regulated learning from different phases

of SRL process. In addition to contrasting theoretical and empirical approaches to understanding SRL as social, papers collectively clarify terminology commonly used and misused to describe the social aspects of self-regulation and motivation.

Regulation of motivation across contexts for learning
Chris A. Wolters, University of Houston, *USA*

This presentation will focus on discussing theoretical and empirical research related to the regulation of motivation, one important facet of self-regulated learning (Boekaerts, 1999; Corno, 2001; Wolters, 2003). As a general definition, regulation of motivation (or motivational regulation) describes those activities through which individuals purposefully act to initiate, maintain or supplement their willingness to start, to provide work towards, or to complete academic activities (Wolters, 2003). This form of self-regulation is achieved by deliberately intervening in, managing or controlling one of the underlying processes that determine this willingness (i.e., the processes of motivation). Students who are better able to regulate their motivation and keep themselves engaged under these types of circumstances should learn more than a student less skilled at regulating her motivation. The purpose of this presentation will be to present and discuss theoretical and empirical research concerning the importance of regulation of motivation across different learning contexts. To achieve this overall objective the presentation will address three related goals. One, the presentation will review motivational regulation as a key feature within a social cognitive model of self-regulated learning, including its theoretical links to motivation and to other aspects of self-regulation. Two, the presentation will discuss the importance of the regulation of motivation across different instructional contexts including its relation to social aspects of learning. Three, the presentation will include an evaluation of empirical work that links the regulation of motivation with students' engagement and performance.

Self-regulation, co-regulation, and shared regulation: Examining the many faces of social in models of self-regulated learning
Allyson Hadwin, University of Victoria, *Canada*
Mika Oshige, University of Victoria, *Canada*

Contemporary models portray self-regulated learning (SRL) as an individual, cognitive-constructive activity (Winne, 1997) that integrates learning skill and will (McCombs & Marzano, 1990). These models have emphasized individual agency and individual differences associated with SRL including self-efficacy, metacognition, goal setting, and achievement (Schunk, 1990, 1994; Zimmerman, 1990). In addition, the notion that social context or environment is an important part of student's SRL is evidenced in Zimmerman's (1989) socio-cognitive model of self-regulation: SRL involves personal perceptions and efficacy, as well as environmental conditions such as support from a teachers and feedback on previous problems. Despite the centrality of social context as an influence in models of SRL, there is not a strong history of developing models or methodologies that explain cognition and context in relation to each other (Bruner, 1996). While some contemporary views of SRL acknowledge external influences and the role of context as inputs to a self-regulatory system, there has been little attempt to bridge theories of SRL that move along the ontological continuum from regulation in the mind of an individual, through regulation as shared and distributed amongst individuals (c.f., Meyer & Turner, 2002). This paper examines models of SRL to investigate the role of social context, interactions, and influence in those models. Models were drawn from a broad continuum from socio-cognitive models (Zimmerman, 1989; 2000), to socio-cultural models (Diaz et al., 1990; Gallimore &

Tharpe, 1990), through to social constuctionist models of SRL (Jackson et al., 2000; Yowell & Smylie, 1999). Specifically, we contrast: (a) the role of social influence, (b) the emerging language for describing self-regulated (self-regulation, co-regulation, or socially shared regulation), and (c) empirical methods for researching social aspects of SRL at various points along a social continuum.

Socially constructed self-regulated learning in collaborative learning groups
Sanna Järvelä, University of Oulu, *Finland*
Hanna Järvenoja, University of Oulu, *Finland*

Although self-regulation research has traditionally focused on an individual perspective, there is an increasing interest in considering these processes at the social level with reference to concepts such as social regulation, shared regulation, or co-regulation (Järvelä & Volet, 2005). The challenge of investigating social processes on SRL led us to apply new kinds of research designs which better match the dynamic processes involved in individuals' interactions in social situations. We examined how 16 groups of university students (N=63) worked with three different collaborative learning tasks in an educational psychology class. Building on previous research and contemporary theories of motivation and self-regulation (Corno, 2001; McCann & Garcia, 1999; Pintrich, 1999; Wolters, 2003) as well as our own work (Järvelä et al. 2000; Järvenoja & Järvelä, 2005; Järvenoja, Volet & Järvelä, 2004), we designed a "dynamic questionnaire" which assesses each group member's engagement in the use of self-, other-, and negotiated regulation strategies. Another essential method used for data collection was the video recordings of students' group work to expand beyond the results of the dynamic questionnaire. Group interviews after the collaboration sessions were also conducted. The data show that the students efforts to control emotions enhanced their interest and satisfaction towards their collaborative work. For example, when the group members agreed upon some of the experienced critical aspects of collaborative work, they showed how they were able to adjust their personal goals and motivation regulation to overcome the challenging situation. The findings also show that in collaborative groups an individual group member can play a leading role in activating motivation regulation and new kinds of ways for motivation regulation emerges among the group members.

Situating motivational orientations and Self-Regulation in socio-cultural educational contexts: An integrative perspective
Avi Kaplan, Ben Gurion University, *Israel*

In this presentation I will challenge a common view of self-regulation as a unitary, distinct, a-contextual construct, and argue that 1) different self-regulated learning strategies are geared towards different objectives; 2) as such, different self-regulated learning strategies become the active manifestation of different motivational orientations for the task; 3) the actual employment of specific self-regulated learning strategies would depend on students' perception of these strategies as available and relevant within the framework of different motivational orientations for the task; 4) students' perceptions of specific self-regulated learning strategies as available and relevant would be different in different socio-cultural contexts within which tasks are construed differently. I will present data from a research project on motivation and self-regulation in writing that support some of these claims. Two-hundred and eleven high school students engaged in a writing assignment and then reported on their achievement goal orientations and self-regulation and writing strategies in that task. Smallest Space Analyses (SSA) indicated that specific self-regulation and writing strategies were perceived as elements within goal orientations, thus suggesting a phenomenological integration of motivation and self-regulation and learning

strategies into task-related "action orientations." The analyses also highlight the different constructions of such action orientations among students from different types of learning environments and among students of different level of ability within these environments. I will conclude with implications of perceiving motivation and self-regulated learning as situated in socio-cultural educational environments to research and practice.

C 5
29 August 2007 08:30 - 10:30
Room: -1.63
Symposium

Assessing potentials for mathematics learning and markers for dyscalculia

Chair: **Jacques Gregoire,** Universite catholique de Louvain, *Belgium*
Organiser: **Jacques Gregoire,** Universite catholique de Louvain, *Belgium*
Organiser: **Annemie Desoete,** Ghent University, *Belgium*
Discussant: **Marcel Crahay,** Universite de Geneve, *Switzerland*

The majority of the tests address the assessment the performance of specific arithmetical abilities. Not many tools are available to give us an explanation for understanding the errors people make. For young children, an instrument that is validated by a combination of theoretical models and therefore can be used for an in-depth diagnostic assessment seems to be the TEDI-MATH (Van Nieuwenhoven, Gregoire, & Noel, 2001). This multi componential instrument is based on a combination of neuropsychological (developmental) models of number processing and calculation. It has an age range form 4 to 8 years of age (kindergarten to 3rd grade) and has already been translated into a German, Dutch, Spanish and French version. The test highlights five facets of arithmetical and numerical knowledge: logical knowledge, counting, representation of numerosity, knowledge of the numerical system and computation. In this symposium researchers from the French speaking part of Belgium and France, the Dutch speaking part of Belgium, Autriche and Germany put there experiences together with this dyscalculia assessment to look for early prenumerical and numerical predictors of mathematics learning and mathematics learning disabilities. In a first paper Gregoire and Wierzbicki investigate if the Piagetian model of number is useful for assessing mathematical learning and disabilities. In a second paper Stock et al. focus on the role of logic thinking, counting and knowledge of number row on arithmetic abilities in preschools. In a third paper Krinzinger and colleages look at gender differences in acquiring the base-10 system of multi-digit numbers. In a fourth paper Desoete et al. elaborates on the predictive value of the tests all other presenters also used to predict arithmetical reasoning and numerical facility in elementary school children. Finally Gregoire and Meert describe how a developmental model can also help to understand the concept of fractions.

Is the Piagetian model of number useful for assessing mathematical learning and disabilities?
Jacques Gregoire, Universite catholique de Louvain, *Belgium*
Claudine Wierzbicki, ECPA, *France*

This research is related to the development of a diagnostic test assessing the development of numerical abilities from 5 to 8. This test, called TEDI-MATH (Van Nieuwenhoven, Gregoire &

Noel, 2001), assess five facets of the numerical development: (1) counting, (2) representation of numerosity, (3) computation, (4) knowledge of the numerical system, and (5) logical operations. The test was standardized in France and French-speaking Belgium. This research investigated the construct validity of the tasks included in the fifth facet, which is related to the Piagetian model of number. Our results showed a very significant relationship between logical reasoning, assed by the Piagetian tasks, and arithmetical abilities at grades 1 and 2. These results emphasized the diagnostic usefulness of Piagetian tasks included in the TEDI-MATH.

The role of logic thinking, counting and knowledge of the number row on arithmetic abilities in preschoolers
Pieter Stock, Ghent University, *Belgium*
Annemie Desoete, Ghent University, *Belgium*
Herbert Royers, Ghent University, *Belgium*

Besides the Piagetian logical operations, several other prenumerical arithmetic abilities seem to be important in the development of arithmetic. The importance of those abilities is however debated heavily and the relation with important arithmetic domains like conceptual and procedural knowledge still remains obscure. In this study, the relation between six prenumerical arithmetic abilities -knowledge of the number row, counting, seriation, classification, conservation and inclusion- and conceptual and procedural arithmetic knowledge was investigated. 242 preschoolers were assessed with different subtests of the TEDI-MATH. The results show that scores on procedural knowledge can be predicted in almost ninety percent of the children based on the achievement on the six prenumerical arithmetic abilities. For conceptual knowledge, only knowledge of the counting row, seriation and inclusion seem to be important. Longitudinal designs are needed in order to investigate causality and the sentence of the relationships between the different factors.

Gender differences in acquiring the base-10 system of multi-digit numbers
Helga Krinzinger, University Hospital RWTH Aachen, *Germany*
Liane Kaufman, Innsbruck Medical University, *Austria*
Hans-Christoph Nuerk, University of Salzburg, *Austria*
Klaus Willmes, University Hospital RWTH Aachen, *Germany*

Gender differences regarding complex mathematical skills favouring males have been repeatedly reported (e.g. PISA, 2003). A popular neurocognitive explanatory hypothesis is the so-called 'spatial cognition hypothesis' (Casey et al., 1992) emphasizing a correlation between spatial cognition and complex computational skills. Considering the spatial orientation of the 'mental number line' (Dehaene, 1992) and the fact that successful retrieval of numerosities requires flawless orientation on the mental number line, gender differences should also emerge regarding basic number processing. Upon collecting normative data for the German version of the calculation test TEDI-MATH 875 children aged 4 to 8 were subjected to tasks tapping abstract counting principles, counting skills, number comprehension, computational skills and approximate number comparison. Findings revealed that males outperformed females on the following subtests: transcoding (first and second grade), number comparison (second semester of first grade and second grade), base-10 system (second semester of second grade) and some aspects of exact computation (first and second grade). On the contrary, gender differences did not reach significance in kindergarten and third grade (the latter might be explained by ceiling effects). Overall, our results suggest that males might develop an earlier understanding of the base-10

system, which is essential for the successful solving of complex computations as well. Furthermore, the results will be discussed with reference to the 'spatial cognition hypothesis'.

Can we predict arithmetical reasoning and numerical facility in grade 3, 4 and 5 from the (pre)numerical skills two years earlier?
Annemie Desoete, Ghent University, *Belgium*
Pieter Stock, Ghent University, *Belgium*

In this study in a longitudinal design the predictive validity of TEDI-MATH on arithmetical reasoning and numerical facility two years later is investigated in 240 elementary school children. The study reveals that we can predict the numerical facility and the arithmetic reasoning for 43 and 48% respectively in grade 3, for 49 and 46% respectively in grade 4, and for 22 and 44% respectively in grade 5. Assessing decomposition and estimation skills in grade 1, 2 and 3 can predict to some extend the development of early arithmetical reasoning but has no added value in the prediction of numerical facility in grade 3, 4 and 5, whereas the assessment of calculation skills and verbal and Arabic knowledge of numbers in grade 1, 2 and 3 seems important to predict both domains in middle and upper elementary school children. The study emphasizes the value of the tasks included in TEDI-MATH.

A developmental model of the understanding of the concept of fraction
Jacques Gregoire, Universite catholique de Louvain, *Belgium*
Gaelle Meert, Universite catholique de Louvain, *Belgium*

Learning fractions is difficult for a lot of students. Step by step, they understand and structure different meanings of fraction: (1) fraction as a division operator, (2) faction as a ratio, and (3) fraction as a number. This evolution reflects a progressive improvement of the understanding of the concept of fraction, related to an in-depth reorganization of the child's concept of number. The goal of the current study was to assess the validity of this developmental model, and to enlighten the conceptual understanding of fraction associated to each step. This developmental model should be used as a reference for the diagnostic of mathematical disabilities.

C 6
29 August 2007 08:30 - 10:30
Room: 0.65
Symposium

New methods for old problems – A deeper look at the cognitive processes related to problem solving

Chair: **Reuven Babai,** Tel Aviv University, *Israel*
Chair: **Wim Van Dooren,** Catholic University of Leuven, *Belgium*
Organiser: **Reuven Babai,** Tel Aviv University, *Israel*
Organiser: **Wim Van Dooren,** Catholic University of Leuven, *Belgium*
Discussant: **Magda Osman,** London University College, *United Kingdom*
Discussant: **Stephen R. Campbell,** Simon Fraser University, *Canada*

Since several decades, researchers in science and mathematics problem-solving consider the distinction between intuitive and analytic forms of reasoning as crucial. Pioneering work on

intuition was conducted by Fischbein (1987), resulting in the intuitive rules theory (Stavy & Tirosh, 2000). Recently, intuitively-rooted mathematical knowledge is studied from conceptual-change perspectives (Vosniadou & Verschaffel, 2004), and intuitive/analytic distinctions are made from situated-cognition viewpoints (Vinner, 1997). Parallelled by this dualism, dual-processing accounts originated in (cognitive) psychological research, including decision making (Kahneman, 2002), social cognition (Chaiken & Trope, 1999), and reasoning (Evans, 2003). Roughly, such accounts contrast heuristic processes (associative, rapid, automatic, effortless) with analytic processes (rule-based, slow, sequential, controlled). Both may compete for the control of behaviour. The symposium aims at discussing how recent dualist cognitive-psychological theories and methodologies can deepen our understanding of problem-solving processes, and considers possible instructional outcomes of such findings. Inglis et al. found that mathematicians respond better to a classical logic task than the general well-educated population. Their inspection-time eye-movement data showed that mathematical education correlates with the use of analytical processes that can override preconscious attention biases. Three other contributions use recent methodologies – so far applied in cognitive psychology and neuroscience – to address the intuitive and analytical reasoning processes related to problem solving. Gillard et al. characterised proportional reasoning as intuitively-based, by experimentally restricting students' reaction times while solving word problems. Stavy et al. used reaction time and fMRI measurements to show how participants reason when overcoming intuitive interference and addressed the role of salience and working memory. Babai el al. showed that conflict training activates control mechanisms to overcome intuitive problem-solving interference, but elongated reaction times indicated that these reasoning processes were effortful. The symposium shows that such methodologies could deepen our understanding of students' reasoning processes, enabling to develop and to evaluate instruction.

Studying advanced mathematics is correlated with analytical reasoning on the Wason Selection Task

Matthew Inglis, Institute of Education, University of Warwick, *United Kingdom*
Derrick G. Watson, Department of Psychology, University of Warwick, *United Kingdom*
Adrian Simpson, School of Education, University of Durham, *United Kingdom*

Two experiments are reported that examine successful mathematicians' responses to the Wason Selection Task, a classic logic task designed to interrogate reasoning behaviour (Wason, 1968). Experiment 1 found that the range of answers given by mathematics undergraduates and researchers was different to the typical range of answers made by the general well-educated population, both in terms of the proportion selecting the logically correct answer, and in terms of the non-logical responses that they made. In Experiment 2 these differences were investigated further using an inspection time eye-movement methodology. It was found that mathematicians spend longer inspecting the cards mentioned in the rule that they reject (the rejected matching cards) than the general population. These findings are analysed in terms of the heuristic-analytic dual process theory (Evans, 2006). It is argued that studying advanced mathematics is correlated with the use of analytical processes on the Wason Selection Task.

Proportional reasoning as a heuristic-based process: In search for evidence in students' reaction times

Ellen Gillard, Catholic University of Leuven, *Belgium*
Wim Van Dooren, Catholic University of Leuven, *Belgium*
Walter Schaeken, Catholic University of Leuven, *Belgium*
Lieven Verschaffel, Catholic University of Leuven, *Belgium*

Proportional reasoning is useful in many everyday life situations. Research has demonstrated, however, that students often over-rely on the proportional model, and use it beyond its applicability range (e.g., Van Dooren et al., 2005). We try to interpret this phenomenon from a dual process framework. Current dual process theories in the reasoning and thinking literature (e.g., Stanovich & West, 2000) claim that operations within the analytic system involve time-consuming executive processing, whereas the heuristic system would operate fast and automatically (Evans, 2003; Sloman, 1996). We set up an experiment to test the claim that proportional reasoning relies on heuristic-based processing, by manipulating students' time to solve proportional and non-proportional word problems. Students in the Long condition had sufficient time to respond thoughtfully, while in the Short condition response time was severely limited (so that the time-consuming analytic system was suppressed). Results did not fully confirm our expectations, but there were indications that proportional reasoning is indeed heuristic-based. In 3 out of 6 classes, students performed at floor level on the non-proportional problems, even in the Long condition, so the expected decrease in the Short condition could not occur. In the other 3 classes, time pressure lead to the expected decrease in the number of correct answers (and to an increase in proportional answers) on non-proportional word problems, while performance on the proportional answers was, as anticipated, not affected.

Brain imaging study of intuitive interference in quantitative reasoning

Ruth Stavy, Tel Aviv University, *Israel*
Dina Tirosh, Tel Aviv University, *Israel*
Reuven Babai, Tel Aviv University, *Israel*

Stavy and Tirosh (2000) proposed that specific task features activate a particular type of rule which has the characteristic of being intuitive (e.g., more A [salient feature] -- more B [the property in question]). This framework was employed here to study the nature of the reasoning processes associated with overcoming the interference caused by this intuitive rule in the context of comparison of perimeters of geometrical shapes. Accuracy of responses, reaction times and brain activity (using fMRI) were measured while participants were asked to compare the perimeters of two geometrical shapes, in two conditions: in-line with the intuitive rule (congruent: larger area – larger perimeter) and counter-intuitive (incongruent: larger area – same perimeter). It was found that in the incongruent condition accuracy dropped and reaction time was longer than in the congruent condition. Moreover, increasing the salience level of the irrelevant feature 'area' or increasing the complexity of shapes resulted in increased interference in the incongruent condition. Evidence for the engagement of bilateral parietal lobes during congruent trials was found by fMRI. Activation of bilateral orbital frontal cortex was evident when subjects inhibited the interference associated with processing the irrelevant salient feature 'area' and correctly completed the comparison of perimeters in the incongruent condition. These results indicate that the reasoning processes underlying correct responding to this problem involve overcoming the interference by inhibiting the irrelevant feature, area. The results indicate that in addition to control mechanisms, other factors such as: congruity, salience, and working memory load have effect on problem solving and point to the need to take them into consideration when teaching science and

mathematics. This study was carried out in collaboration with Vinod Goel, York University, Toronto, Canada; Hugo Critchley and Ray Dolan, Wellcome Department of Cognitive Neurology, London, UK.

Can we inhibit intuitive interference by cognitive conflict training? A reaction time study
Reuven Babai, Tel Aviv University, *Israel*
Ruth Stavy, Tel Aviv University, *Israel*
Dina Tirosh, Tel Aviv University, *Israel*
Hanna Zilber, Tel Aviv University, *Israel*

The current study focuses on comparison of areas and comparison of perimeters of geometrical shapes in the framework of the intuitive rule more A – more B. Our recent findings suggested that conflict training could improve students' performance. Here we used such training and compared accuracy of responses and reaction times before and after training. Two test conditions were examined, congruent: in which correct response is in line with the rule and known to elicit correct responses, and incongruent: in which correct response runs counter to the rule leading to low rate of success (this condition included two types of tasks: incongruent-inverse and incongruent-equal). Two eighth's grade classes took part in the study. One class, the experimental group, received cognitive conflict training while the other, the control group, did not. The results of the study show that in terms of accuracy of responses in the incongruent condition, the experimental group significantly benefited from the intervention as compared with the control group. In addition, it seems that the cognitive conflict training activated control mechanisms that are effortful as was evident from the reaction times results. We believe that researchers in science and mathematics education would benefit from applying cognitive psychology techniques, as was done in the current study. Using such methodologies could lead to a deeper understanding of students' difficulties and reasoning processes, enabling to develop and to evaluate improved instructional strategies.

C 7
29 August 2007 08:30 - 10:30
Room: 2.54 Novobátzky
Symposium

What makes tutored learning effective?

Chair: **Joerg Wittwer,** Leibniz Institute for Science Education, Kiel, *Germany*
Chair: **Matthias Nückles,** University of Göttingen, *Germany*
Organiser: **Joerg Wittwer,** Leibniz Institute for Science Education, Kiel, *Germany*
Organiser: **Matthias Nückles,** University of Göttingen, *Germany*
Organiser: **Alexander Renkl,** University of Freiburg, *Germany*
Discussant: **Päivi Häkkinen,** University of Jyväskylä, *Finland*

There is ample empirical evidence that human tutoring is an effective means of instruction. One important source of its superiority over other instructional forms lies in tutors' skilful use of pedagogical strategies. In order to systematically foster students' learning, intelligent tutoring systems have captured these benefits by mimicking the most successful tutoring strategies. Nevertheless, research so far has failed to delve more deeply into the interrelationships between

tutors' tactics and moves and tutees' learning and perception. In this symposium, we aim to highlight recent research results that shed light on tutoring effectiveness as a function of the tutors' didactic skills and practices. Keith Topping and Allen Thurston present a study in which they examine the relevance of tutoring intensity for learning core skills, such as reading and mathematics. Marijke De Smet et al. analyze the effectiveness of tutors' contributions in stimulating tutees' cognitive development when tutors are forced to reflect on their own interventions. In a similar vein, Joerg Wittwer et al. focus on tutors' instructional explanations and present a support procedure improving adaptation to the tutees' learning prerequisites. Linda Price investigates the question of how tutees' perceptions of effective tutoring might differ as a function of the tutoring context (computer-mediated tutoring vs. face-to-face tutoring) and discusses the differences with respect to the tutors' pedagogical skills. Finally, Ron Salden et al. examine the effects on tutees' conceptual understanding in mathematics when they use an intelligent tutoring system, a so-called Cognitive Tutor, that combines the theoretical rationales of problem-solving and example-based learning.

Fife peer learning project: Intensity and type of tutoring
Keith Topping, University of Dundee, *United Kingdom*
Allen Thurston, University of Dundee, *United Kingdom*

The aim of this project is to enhance the achievement of primary school pupils in Fife in core skills in reading and mathematics. It is a randomly allocated trial, in which different intensities and types of tutoring are randomly allocated to the 123 primary schools participating. Sometimes older children tutor younger children across year groups and sometimes pupils tutor others of the same age within year groups. Sometimes intensity is light (once per week), sometimes heavy (three times per week). Sometimes reading is allocated, sometimes mathematics, and sometimes both. This yields 12 different combinations of tutoring, each operating in about 10 schools. P4 (8 year old) and P6 (10 year old) pupils participate. Research assistants work with the schools to train, consult and guide the tutoring. Data are collected before, during and after the peer learning programmes on academic progress in core skills. All primary schools in Fife already use PIPS (Performance Indicators in Primary Schools) assessments from the CEM Centre in Durham and several use MidYIS (Middle Years Information System). Data on P4 and P6 pupils are collected using the current PIPS assessment and a new re-administration of an extended version of this assessment is done at the end of the P7 year (11 years old). Pupils going into secondary school are assessed at the end of S1 (12 years old) (with an extended version of the PIPS P7 assessment) and S2 (13 years old) (with a new assessment currently being developed specifically for the end of the 5-14 phase). Attitudinal data are also collected from the Extended MidYIS tests during S1. Although the project will last for two years and is not yet complete, it is possible to make some early comments. These will focus particularly upon the effects of the 12 types and intensities of tutoring.

Cross-age peer tutors in asynchronous discussion groups: Promoting tutors' efficacy beliefs and grading up the quality of interventions
Marijke De Smet, Ghent University, *Belgium*
Hilde Van Keer, Ghent University, *Belgium*
Martin Valcke, Ghent University, *Belgium*

This study focused on blending in cross-age peer tutoring with asynchronous discussion groups to empower online collaboration. More specifically, fourth-year graduate students served as online tutors to provide structure and scaffolds in order to foster freshmen's knowledge construction and

cognitive development. Preceding research, however, revealed that tutors were mainly engaged in providing social support, while less attention was paid to stimulating cognitive development. Taking these results into account and considering that the tutor is a protagonist in facilitating students' learning processes, the main aim of this study was to improve the quality of peer tutors' interventions by stimulating self-monitoring and self-regulation of their own contributions. An improvement of tutors' self and group-efficacy beliefs was striven for as well. The study was conducted in a naturalistic university setting. Thirty-five tutors each supported 10 freshmen during 4 discussion themes of 2 weeks. Tutors were randomly assigned to an experimental or control condition. Both conditions received a training based on Salmon's five-step model for e-moderating. In addition, experimental tutors were required to label each intervention by associating it to one of the e-moderating steps. This aims to stimulate reflection about how to intervene in order to improve collaboration. Moreover, labeling visualizes the predominance or absence of one or more e-moderating steps. In this respect, tutors are stimulated to self-monitor and regulate their interventions. Tutors' interventions were analyzed by means of a content analysis scheme based on Salmon's model. Furthermore, after each discussion theme tutors completed self-efficacy and group-efficacy questionnaires. Preliminary results indicate that experimental tutors demonstrate more varied support with a better balanced range of different types of interventions. The results further indicate differences with regard to tutors' self-efficacy and group-efficacy beliefs favoring the experimental condition.

When do tutor-generated explanations help students acquire deep knowledge?
Joerg Wittwer, Leibniz Institute for Science Education, Kiel, *Germany*
Matthias Nückles, University of Göttingen, *Germany*
Alexander Renkl, University of Freiburg, *Germany*

Tutors with only little training in didactic skills often dominate the tutorial dialogue and provide tutees with instructional explanations that do not promote their learning. One reason for the ineffectiveness of tutor-generated explanations lies in tutors' insufficient skills in correctly assessing tutees' understanding. In order to test whether the effectiveness of instructional explanations in tutoring can be improved by helping tutors to assess the tutees' knowledge prerequisites, we conducted an experiment with 30 tutors and 30 tutees. We compared an experimental condition in which tutors received information about the tutees' prior knowledge and a control condition without such information. Results showed that tutees in both experimental conditions acquired a substantial amount of declarative knowledge. However, tutees were better able to apply their newly acquired knowledge to novel problems when they were provided with explanations from tutors who had information about the tutee available. In addition, these tutees also had fewer false beliefs about the concepts being applied. The findings demonstrate that instructional explanations can be successfully used as a pedagogical strategy to foster a deep understanding about a knowledge domain. They are suggestive of ways in which even unskilled tutors might provide effective instruction.

Effective tutoring: What do students think and what is their experience?
Linda Price, Open University, *United Kingdom*

There is an increasing use of information technology in higher education. On the one hand, there is a move from paper-based to electronic materials; on the other hand, there is a move from face-to-face support to online support. In campus-based programmes, both kinds of development may be happening simultaneously, and so it is difficult to disentangle their respective consequences for the students' experience. However, examining tutorial support in distance education becomes more

feasible as there is often a clearer separation between the central design and production of instructional materials and tutorial support for students. Nonetheless, it is important to investigate students' conceptions of effective tutoring before examining their experiences of being tutored in online contexts and how they compare and contrast with face-to-face experiences, particularly if any kind of automated tutorial support is ever to be realistically considered. The findings reported are drawn from two studies that investigate students' views of effective tutoring in a distance education context. One is a quantitative study that investigates students' beliefs about what constitutes effective tutoring; the other is a qualitative study that compares and contrasts students' experiences of tutoring in face-to-face and online contexts. Both studies show that academic support is only one aspect of what students consider to be effective tutoring. The comparison of students' experiences in the online and face-to-face contexts illustrated that while they held similar conceptions of tutoring their experiences were different – where the online experience tended to be inferior to the face-to-face. This suggests that there is much work to be done in understanding the nature of online communication and how to achieve effective online interaction before online tuition can be deemed to be as effective as face-to-face tuition.

Does learning from examples improve tutored problem solving?
Ron Salden, Carnegie Mellon University, *USA*
Vincent Aleven, Carnegie Mellon University, *USA*
Alexander Renkl, University of Freiburg, *Germany*
Rolf Schwonke, University of Freiburg, *Germany*
Joerg Wittwer, Leibniz Institute for Science Education, Kiel, *Germany*
Carmen Krieg, University of Freiburg, *Germany*

Although problem solving supported by Cognitive Tutors, an intelligent tutoring system, has been shown to be successful in fostering initial acquisition of cognitive skills, this approach does not seem to be optimal with respect to focusing the learner on the domain principles to be learned. In order to foster a deep understanding of domain principles and how they are applied in problem solving, we combine the theoretical rationales of Cognitive Tutors and example-based learning. Results from two lab studies indicate that while the effectiveness between a standard Cognitive Tutor and an example-enriched Cognitive Tutor does not differ, the example-enriched Cognitive Tutor is more efficient in terms of learning time. Furthermore, when additional instructions on the use of the Tutor are provided, the example-enriched Tutor is more efficient in terms of learning time and it significantly increased the students' conceptual understanding. Based on these findings the example-enriched Tutor has been further optimized to take the individual student's progress into account. This refined example-enriched Tutor is being addressed in current and upcoming experiments.

C 8
29 August 2007 08:30 - 10:30
Room: 0.89 Jedlik
Symposium

Understanding and improving teacher learning: the gateway to educational innovation

Chair: **Jan Vermunt,** Utrecht University, *Netherlands*
Organiser: **Jan Vermunt,** Utrecht University, *Netherlands*
Organiser: **Kirsti Lonka,** University of Helsinki, *Finland*
Discussant: **RobertJan Simons,** Utrecht University, *Netherlands*

Teachers are supposed to be experts in learning. Although there is a lot of research on how teachers may promote student learning, the scarcity of systematic research on understanding and improving learning processes of teachers themselves is striking. Yet, teachers are the most important agents in shaping education for students and in bringing about change and innovation in educational practices. Too often educational innovations failed because they did not recognize the need for teacher learning. Professional development throughout a teaching career presupposes lifelong learning processes and willingness to learn from teachers. Educational innovations put a high demand on teacher learning processes and teachers' willingness to learn. Teachers may react differently, varying from rejecting the innovation and a concurrent perception of no need to learn, to seeing the innovation as a potential for learning. This symposium aims to bring together five studies on teacher learning from a variety of perspectives. They cover various phases of teachers' professional career from student teachers to experienced teachers. They cover a variety of contexts and topics dealt with: teachers' learning activities, learning outcomes, and orientations of learning to teach; teachers' learning from work in practice; teachers learning from researching their students' learning; teachers learning from comprehensive school reform; teachers' learning from collaborative action research in the context of educational innovation, teachers' learning in a national educational innovation project on student learning; and the school as learning environment for teachers. The scientific relevance of the symposium lies in the advancement of our understanding of teacher learning in the context of teacher education, lifelong professional development and educational innovation and change. Relevance for educational practice lies in the growing awareness that any attempt to improve education should put teachers and their learning in the central focus of attention.

Developing student teacher learning: a longitudinal study
Vincent Donche, University of Antwerp, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*

This study explores whether orientations to learning to teach are subject to change across time and whether these changes, as former research findings suggest, exhibit a tendency from more survival-oriented towards more meaning-oriented learning (e.g. Oosterheert & Vermunt, 2001). 253 third-year student teachers from an initial pre-service teacher education institute in Belgium offering a 3-year non-academic teacher education programme participated in this study. A pre-test/post-test-design was used. Students filled in the Inventory Learning To Teach Process (ILTP) questionnaire on two occasions: 1) at the beginning of the second semester and 2) at the end of the second semester of the academic year. The two measurement moments were separated by a long

teaching practice placement period (on average six weeks) in which students acquired hands-on teaching experience in the classroom. In this study it is assumed that the teaching practice placement and related activities may exert an influence on the development of student teachers' orientations to learning to teach. In this study three distinctive orientations to learning to teach could be distinguished: a closed-meaning orientation, a closed-reproduction orientation and a survival orientation. These orientations are to some extent in line with previous research. The study demonstrates that students score higher on learning conceptions and learning strategies which are characteristic of more meaning oriented learning in the second measurement. Orientations to learning to teach are found to be subjective to a relative degree of change. Especially survival oriented student teachers appear to have undergone a greater degree of change in their learning conceptions and learning strategies after the long teaching practice placement. Regarding to curriculum development, the results suggest that introducing longer teaching practice placements and related activities during teacher education degree courses, this may be a lever for motioning survival oriented learners to change their orientation to learning to teach.

Comprehensive school teachers as learners in school development
Kirsi Pyhalto, Helsinki University, *Finland*
Tiina Soini, Tampere University, *Finland*
Janne Pietarinen, Joensuu University, *Finland*
Jyrki Huusko, Joensuu University, *Finland*

Success in bringing new ideas into schools is greatly dependent on teachers will and motivation to adopt and process the ideas in several different levels in their daily work. Accordingly it is important that comprehensive school teachers have grown into skilful learners, who master the art of learning to learn in many levels. Teacher's willingness to learn and promote innovations in the school community is largely dependent on significance given to the new situation by the teachers and their sense of agency in their working environment. It is presumable, that teachers that consider themselves active agents are more successful in coping with educational reforms and implementing instructional and educational innovations in their work. This paper explores comprehensive school teachers' professionality and the school as their learning environment at the context of most recent comprehensive school reform, in Finland: implementation of undivided basic education (UBE) that aims to develop inner coherence of comprehensive schools. This paper reports a case study, that explores how comprehensive school teachers themselves (N =193) from nine different schools, view their professionality in the context of UBE. The data were collected by using activating and participative method: "Recalling of the future". Preliminary results suggest that teachers had quite positive and convergent ideas about the main idea of UBE. As a core most of them emphasized consistency of pupils' learning-path and construction of collaborative school culture. At the same time teachers' analysis about the UBE and how to promote the process were quite non-specific, fragmented and narrow. Most teachers found the systemic approach demanding. Moreover only 37% of the teachers had attained active agency in the terms of UBE. This suggests that, more attention be paid to developing school as collaborative and activating learning environment for teachers, wherein the process of shared sense making and ownership are emphasised.

Teacher learning in the context of innovation: The learning activities of experienced teachers
Inge Bakkenes, Utrecht University, *Netherlands*
Jan Vermunt, Utrecht University, *Netherlands*
Theo Wubbels, Utrecht University, *Netherlands*

The study that is discussed in this paper describes both visible and mental learning activities that experienced secondary school teachers engage in. Starting from an individual, cognitive psychological perspective, the study illuminates how different learning activities are connected to each other and to learning outcomes. The study was conducted within the context of a national renewal in secondary education in the Netherlands, using digital logs. Eight main categories of learning activities could be distinguished: experiencing friction, experimenting, reflecting on own – and students' functioning, learning through others, relating own learning experiences to student's learning, struggling with behavioral tendencies, reflecting on own learning and avoiding learning. Experiencing negative friction (unexpected events/ unsatisfying results) is the most frequently reported learning activity. This activity often forms the start of a sequence of other activities. Learning activities that involve meaning–oriented reflection lead to more and stronger changes than learning activities that are characterized by immediate performance-oriented reflection. The teachers primarily reported changes in cognition.

Tools for inquiry and the role of feedback in teachers' learning
Vivienne Baumfield, University of London, *United Kingdom*
Elaine Hall, Newcastle University, *United Kingdom*
Steve Higgins, University of Durham, *United Kingdom*
Kate Wall, Newcastle University, *United Kingdom*

This paper investigates how the use of tools designed to elicit, record and analyse the development of students' awareness of their own learning processes supports teacher inquiry and subsequent professional learning. Data is drawn from the Learning to Learn (L2L) Phase 3 Evaluation, a three year collaborative action research project. Participants are drawn from 25 schools in England and represent a range of school contexts (Higgins et al. 2006). The project was designed to enable teachers to increase their students' awareness of their own learning within a broad dispositionally-focused pedagogical framework. The data set consists of over 60 case studies reporting the impact of action research on student learning and teachers' own professional development; 30 semi-structured teacher interviews from each annual action research cycle; annual cross-project analysis and a three-year overview conducted by the University partner and a teacher questionnaire completed towards the end of the last year of the project. In addition, informal channels of communication (email and personal contacts with teachers), whilst limitations as a reliable source of evidence are acknowledged, they have been included in the process of interpretation. Analysis focuses on the role of feedback in teachers' learning through three dimensions: from the students as part of the pedagogical encounter; from colleagues within the context of the action research projects; from the university researchers in their capacity as 'critical friends'. Links between the tools used, the source and content of the feedback, teacher characteristics and appraisal of their own learning are mapped from a 'second order perspective' derived from the diverse data sources. The resulting taxonomy contributes to our understanding of what is transmitted, negotiated and constructed through the feedback loops and interactions and the extent to which participation in the project has enabled the teachers to develop a language for learning.

C 9
29 August 2007 08:30 - 10:30
Room: -1.62
Symposium

Networking a variety of theories within a scientific domain - the case of mathematics education

Chair: **Tommy Dreyfus,** Tel Aviv University, *Israel*
Organiser: **Ferdinando Arzarello,** Universita di Torino, *Italy*
Organiser: **Angelika Bikner-Ahsbahs,** Universität Bremen, *Germany*
Organiser: **Stefan Halverscheid,** Universität Bremen, *Germany*
Organiser: **Ivy Kidron,** Jerusalem College of Technology, *Israel*
Discussant: **Baruch Schwarz,** Hebrew University of Jerusalem, *Israel*

We analyze a number of deep and connected issues of theory formation, which have become relevant for the mathematics education research community recently, and which we believe to be equally relevant for other educational research communities. The crucial importance of theory for research has become apparent to our research community in the 1970s and 1980s, mainly in Europe. The awareness of the need for theory has led to institutional requirements for theoretical frameworks and hence to a plethora of theories with a large variety of purpose, breadth, tradition, elaboration, and mesh size. Some were used locally in the geographic sense, for example in France, others locally in the sense of the research focus, for example teacher beliefs. On the other hand, the phenomena to be explained by our research are not local. As a research community, we aim to understand, in an integrated manner, the complex processes of learning and teaching mathematics: Motivation, cognition, communication, tool-use, and beliefs, within varying social, physical and historical contexts. Having many disconnected theories is detrimental to a scientific discipline since it hinders communication across borders between research teams, countries and cultures. Combining, networking or integrating several theories has considerable potential for adapting our theoretical understanding to the complexity of the practice of learning and teaching mathematics. However, the process of combining theories presents substantial difficulties, from different traditions using the same words from different issues to the identification of hidden underlying assumptions. In the symposium, we will discuss various aspects of the potential and difficulties of combining theories. These are issues of concern to the mathematics education research community. We propose to discuss them at EARLI because we believe that similar issues are relevant to other research communities in education. We aim to identify these, and hope to learn from their experience

Epistemic actions in modelling processes: Potentials and perspectives
Stefan Halverscheid, Bremen University, *Germany*

The nested epistemic actions model of abstraction in context and the modelling framework are considered simultaneously to analyse students' work in a modelling situation with different tools but the same mathematical setting. The mathematical situation is given by the task to understand rectangular and circular billiard games. For this, two different tools are given to the students: Either they have the opportunity to carry out experiments on billiard tables or they are provided with dynamic geometry software to simulate those. The empirical data of student groups working in these contexts is used to relate theories on the modelling framework with the nested epistemic

actions model of abstraction in context. The guiding question is what epistemic actions in modelling situations actually are. It is also investigated whether epistemic actions differ according to whether a modelling approach with experimental tools or a simulation approach with computer tools is taken.

Potential and problems with networking theories in view of the role of cognition in different theories
Tommy Dreyfus, Tel Aviv University, *Israel*

Mathematics education as a research domain deals with the learning and teaching of mathematics. One of the central concerns of mathematics educators is therefore how learners conceive mathematical contents – fundamentally a cognitive issue. This contribution focuses on how three theories of learning mathematics, the Theory of Didactic Situations, the Three Worlds of Mathematics, and the Nested Epistemic Actions Model of Abstraction in Context deal with this cognitive issue. We found that they have different cognitive priorities, they describe different parts of the process of coming to know, they are relevant at different time scales, and they have different grain sizes of analysis. Given these differences, we analyze whether and how they can complement and enrich each other. The theoretical work involved in connecting or networking them is highly non-trivial, because it entails a detailed examination of the constructs used in each theory, and the existence and relevance of related constructs in the other theories. Moreover, hidden assumptions underlying the different theoretical frameworks may imply possible contradictions. The work of establishing links between theories is important for the progress of mathematics education. We ask whether it is equally important in other educational research areas.

Potential and problems with networking theories in view of the role of context in different theories
Ivy Kidron, Jerusalem College of Technology, *Israel*

We investigate the role of context in mathematics leaning processes. The complexity of learning processes might be related to the different contextual influences on the learner's construction of knowledge. Among the contextual influences, we include the epistemological nature of the given mathematical domain, the learner's previous knowledge, the social interactions and/or the "instruments" which are used in the learning process. Some parts of the context are given in advance, for example, the nature of the mathematical content domain. Other parts of the context have a "dynamic" nature in the sense that the learner interacts with the context. This might be the case for social interactions or the interaction of a solitary learner with a computer. In all these cases, context has a crucial influence on the learning process. Each theoretical framework has its own way to consider the role of context on the learning process. In this presentation, we analyze the insights offered by three different theoretical approaches, the process-object approach, the instrumental approach and the nested epistemic actions model of abstraction in context on the contextual influences of the learner's construction of knowledge. Moreover, we analyze how the networking between the three approaches permits a deeper analysis of the role of context and as a consequence a deeper understanding of the learning processes.

Potential and problems with networking theories in view of the role of verbal and nonverbal communication in different theories
Ferdinando Arzarello, Universita di Torino, *Italy*

Considering the phenomenology of learning processes in mathematics classes, a variety of semiotic resources are observable, namely those used by students and teachers in their actions and

productions: words (oral or written); extra-linguistic modes of expression (gestures, glances, actions); different types of inscriptions (drawings, sketches, graphs); instruments (from the pencil to the most sophisticated ICT devices), etc.. To grasp learning processes it is important to take into account all such resources, the activities they allow and how they evolve within the classroom. The presentation will discuss the three components above according to different theories (the Anthropological Theory of Didactics of Chevallard, the Theory of Didactic Situations of Brousseau, the Social Theory of Objectification of Radford and the Action-Production-Communication-space theory of the author). Hence it will illustrate the potential that using different frames can offer with respect to an approach centred on the use of a single theory, that is: (i) how the different theories can give different insights in describing the complex role that the semiotic resources, and their mutual dynamic relationships can play in the mathematics classroom; (ii) how combining some of the different lenses can produce an interesting progress for entering in the learning processes. The idea behind networking is not constraining theories within a unique frame -an impossible enterprise- but of showing the new insights that different approaches can give to specific learning problems. Each theory retains its specificity; the commonality is in the analysed problem and in the richness that the different approaches can give to our understanding of teaching-learning phenomena. The presentation will discuss the issue of the mutual coherence according to the notion of complementarities, as introduced by Steiner in 1985.

"Sensitizing concepts" as heuristics to compare and connect different theories
Angelika Bikner-Ahsbahs, Universität Bremen, *Germany*

What kind of heuristics could support processes of building networking theories? This paper presents a first answer through investigating how a group of networking researchers acted while comparing and connecting different theories. In spring 2006 researchers from different countries met to discuss the possibility of building networking theories by analysing the same data from their different theoretical points of view. Some of them submitted a paper for the fifth Conference of European Research in Mathematics Education (CERME5) focussing on the aspect of social interactions in three different theories. The main question was what each theory could offer for and gain from the other two. This paper is taken as data base for a discursive analysis in order to find out what heuristics the researchers used to compare and connect their theories. At the beginning of my talk, the three theories and their central ideas concerning the question posed are presented. Secondly these theories are seen as parts within a networking framework. Thirdly, the way of comparing and connecting the theories are reconstructed from a distanced standpoint. The result is that the researchers used implicit and not exactly defined common concepts as sensitizing concepts for their comparison. These concepts are not part of the theories; they act on a meta-theoretical level guiding the networking process. Therefore I assume that such sensitizing concepts could be looked for and used explicitly as connecting knots for building networking theories.

C 10
29 August 2007 08:30 - 10:30
Room: 0.100D
Symposium

Benefits and risks of bias in self-evaluations of academic competence

Chair: **Therese Bouffard,** University of Quebec, *Canada*
Organiser: **Therese Bouffard,** Universite du Quebec a Montreal, *Canada*
Discussant: **Ruth Butler,** Hebrew University, *Israel*

Whether or not positive illusions about the self are characteristics of well-being and successful developmental adaptation is a controversial issue in the literature. In the academic context, it has been repeatedly showed that students' positive self-perceptions are linked to their motivation, persistence, self-regulation and achievement. However what happens when those perceptions are inflated and detract from true competence? Several scholars and clinicians (e.g. Bandura, 1986; Hoffman, Cole, Martin, Tram, & Seroczynski, 2000; Taylor & Brown, 1994) argue that positive bias about the self is adaptive because it acts as an inner resource that fuel the motivation to learn, promotes persistence in face of difficulties and protects from negative emotions. On the other side of the debate, researchers (Baumeister, Smart, & Boden, 1996; Colvin, Block, & Funder, 1995) believe that unrealistic positive self-perceptions is conducive to faulty evaluation of situations and thus to either expose oneself to unattainable goals or to adopt self-defeating or self-handicapping strategies. It is not yet clear which of the two perspectives best describes the impact of positive illusions about the self. The general purpose of this symposium is to further examine this issue. All four studies investigated the issue in the realm of the cognitive domain but involved samples of different ages. By putting together results of research from four countries, France, Greece, Germany and Quebec, this symposium may help to identify both positive and negative correlates of positively biased self-perceptions. Empirical results concerning the benefits and risks of bias in academic self-evaluation are particularly important for instructional contexts, requiring self-regulation skills.

Motivational patterns of learning among adolescents: The role of overestimation, underestimation, and accuracy of self-efficacy beliefs.
Eleftheria N. Gonida, Aristotle University of Thessaloniki, *Greece*
Angeliki Leondari, University of Thessaly, *Greece*
Grigoris Kiosseoglou, Aristotle University of Thessaloniki, *Greece*
Vassiliki Deliyianis-Kouimtzis, Aristotle University of Thessaloniki, *Greece*

The aims of the present study were: (i) to examine the motivational patterns of learning of students who overestimate, students who are accurate, and students who underestimate their performance within a particular school domain (math or language), and (ii) to identify those students who have a more generalized tendency to over- or underestimate their efficacy beliefs (i.e., in both math and language) and to describe their profile. A sample of 6503 adolescents aged 15-16 years of age participated in the study and were asked to complete a set of self-report questionnaires measuring the following variables: self-efficacy beliefs for math and for language separately, interest for these two domains, persistence, achievement goal orientations, perceived school goal structures, perceived parent goals, and causal attributions. First, the students with accurate, over- or underestimated self-efficacy beliefs for math and for language were identified. Data analyses indicated that the overestimation group manifested a more adaptive motivational profile in general.

Similarly, the accurate group showed more adaptive motivational patterns of learning than the group of underestimation. This was true when either math or language was examined. However, except the potentials, the overestimation group was vulnerable to some risks, too. Finally, the groups of students with the more generalized efficacy beliefs will be profiled. The results will be discussed in terms of their significance for the educational context.

Prediction, stability and consequences of biases of self-evaluation among elementary school children

Therese Bouffard, Universite du Quebec a Montreal, *Canada*
Aurelie Lengele, Universite du Quebec a Montreal, *Canada*
Carole Vezeau, College Joliette-de-Lanaudiere, *Canada*

A four-year longitudinal study examined 300 elementary school children in order to investigate 1) to what extend bias in self-evaluation is a child enduring characteristic over time; 2) parents' contribution to their child development of bias in self-evaluation; 3) whether there is relation between children's bias in self-evaluation and well-being. At each year, standardized residuals of the regression of self-perceived competence on IQ served to assess children's bias in self-evaluation. Parents' variables and children's well-being were assessed respectively at the first and at the last year of the study. Results showed that children's bias in perceived competence is fairly consistent over time. Parents' self-efficacy (b = ,17) and recall of their own perceived competence as pupil (b = ,16), as well as children's appraisal of performance goals valued by their parents (b = ,32), and level of their unconditional support (b = ,27) are significantly linked to children's biases. Findings of these studies provide evidence as to an adaptive value of biased positive self-perceptions.

Accuracy of self-efficacy, and satisfaction with performance: Are there affective costs of positive self-efficacy biases?

Susanne Narciss, University of Dresden, *Germany*
Markus Dresel, Universität Ulm, *Germany*

Positive biases of self-efficacy are widely thought to have motivational benefits (i.e. rising persistence, increasing resilience after failure; see Taylor & Brown, 1988). Yet, they might be also associated with risks such as inadequate task choice or affective costs. This study aimed at investigating the development of self-efficacy strength, self-efficacy accuracy, performance and satisfaction with performance if students assess their self-efficacy accurately, positively biased or negatively biased. To this end we reanalysed the data of a study in which self-efficacy, performance and satisfaction with performance were measured before, during and after four training sessions in three fifth-grade classes. The control group had no specific training, whereas the MW-Reattribution group worked with the arithmetic training MatheWarp and was provided with reattribution feedback (Dresel, 2004). The MW-KR group worked with MatheWarp but was provided with knowledge of result feedback (KR). Results show that the training groups enhanced their performance significantly whereas there was no performance enhancement for the control group. However, self-efficacy beliefs did not change in the same way as performance. Self-efficacy decreased slightly in the MW-Reattribution group and in the control group, whereas it increased in the MW-KR group. Self-efficacy accuracy decreased in the training groups, whereas it remained almost constant in the control group. Satisfaction with performance increased in all groups, yet it increased most in the MW-KR group, and least in the MW-Reattribution group. The analyses concerning differences associated with biases of self-efficacy provided little evidence that

there are affective costs of positive biases: Students with positive self-efficacy biases rated their satisfaction with performance always higher than students with negative biases.

Positive biases in self-evaluation, achievement goals, and performance among high-school students
Caroline Dupeyrat, Universite de Toulouse LeMirail, *France*
Christian Escribe, Universite de Toulouse LeMirail, *France*
Isabelle Regner, Universite Toulouse LeMirail, *France*

The study conducted on a sample of French high-school students examined how biases in self-evaluations of math competence relate to achievement goals and performance. It was expected that a mastery goal oriented person should neither seek to protect or enhance her self-view but strive for realistic self-evaluations. For performance goal oriented individuals, self-evaluations should primarily serve an emotional or ego-defensive function and therefore be guided by self-enhancement and/or self-protection motives leading to biased positive self-evaluations. Results tend to confirm these expectations and provide evidence for the positive consequences of optimistic self-evaluations on academic performance.

C 11
29 August 2007 08:30 - 10:30
Room: -1.64
Symposium

Science teaching in four countries – Findings from international video studies beyond TIMSS

Chair: **Tina Seidel,** IPN - Leibniz-Institute for Science Education, *Germany*
Organiser: **Tina Seidel,** IPN - Leibniz-Institute for Science Education, *Germany*
Organiser: **Mareike Kobarg,** IPN - Leibniz-Institute for Science Education, *Germany*
Discussant: **David Clarke,** University of Melbourne, *Australia*

Results of international comparative studies such as PISA or TIMSS indicate serious deficits in students' scientific literacy worldwide. Especially tasks requiring scientific inquiry or the transfer of knowledge cause problems for many students. These results have lead to an increased interest in the design of science instruction in different countries. The recently published TIMSS 1999 Science Video Study investigated science teaching in five countries. The goal of this study was to compare countries with high achievement levels in TIMSS, to describe their science teaching practices and to compare these approaches to U.S. science teaching. Within science teaching practices science contents, teacher actions and student actions as cultural approaches enacted in science lessons were focused. The findings of this comprehensive international video study gave insight in many facets of science teaching worldwide. Thus, they provide an important basis that allows to integrate additional and extended studies on science teaching. The proposed symposium brings together four studies, that have been - in some way or the other - inspired by the international TIMSS video approach. At the same time these studies have chosen additional research questions, research designs and methods in order to extent and broaden the knowledge about enacted international science teaching practices. The extensions refer to country specific didactic approaches in science teaching, to in-depth analysis of teacher-student-interactions in

enacting science inquiry, and to investigations of effects of science teaching on student learning. The presentations refer to science teaching in four countries, namely USA, Czech Republic, Switzerland, and Germany. Through presenting the findings of these studies beyond TIMSS we hope to stimulate the discussion about three aspects: What do we know about science teaching and science inquiry practices? What are research questions still to be tackled? What are research designs and approaches to describe science teaching practices internationally?

The Structure of Physics Instruction in the Czech Republic: The research approach and results form CPV video study
Tomas Janik, Masaryk University, *Czech Republic*
Marcela Mikova, Masaryk University, *Czech Republic*
Petr Najvar, Masaryk University, *Czech Republic*

In the TIMSS video studies, Czech pupils failed to meet the expectations in various areas including scientific literacy. This fact alone calls for further research aiming at science teaching practices in Czech classrooms including country-specific didactic approaches. This presentation deals with physics instruction in the Czech Republic. In the CPV video study of Physics project that was carried out at the Educational Research Centre of the Masaryk University in Brno, Czech Republic, the video study approach was employed. 62 lower secondary school physics lessons were videotaped and analysed regarding the concepts of "opportunities to learn" and "lesson structure". The project aimed at finding out what opportunities to learn physics teaching offers, what the structure of physics instruction is and in which ways the content of physics teaching is represented. The project was designed as a comparative study, which is seen as a powerful tool in inquiring into formalised and taken-for-granted instructional procedures. The findings were found consistent with the findings of the TIMSS 1999 Video Study showing that physics instruction in Czech schools is largely teacher-centred, allowing considerably less time for pupils' individual work or group work. Teaching phases in which the content is practised or applied are often found, whereas those employing motivation or metacognition appear rarely. We hope the presented results of the CPV video study of Physics project will stimulate discussion about improving the quality of science teaching practices in the Czech Republic and internationally.

Learning and teaching physics: Results of a Swiss video study
Birte Knierim, PH Bern, *Switzerland*
Martina Bruggmann, PH Bern, *Switzerland*
Peter Labudde, PH Bern, *Switzerland*

Two periods of physics instruction on 'force' or 'geometrical optics' were videotaped in 40 grade 9 classes during school year 2003/04. The videos were then transcribed and analysed by applying different coding schemes, looking at organisation of classroom activities, quality of classwork, role and function of experiments and basic structures of the instructional process. Three student questionnaires, implemented at the beginning and the end of the school year and right after the videotaped lessons, as well as a teacher questionnaire yielded further data. The video data indicates that the time spent on student work (67%) is twice as much than the time of plenum instruction (33%). During plenum phases, lecturing dominates (60% of the 33%), while group and partner work dominate during student work (45% and 22% of 67%). About two thirds of the lesson time is devoted to experiments, performed in group or individual work (54% of the experiments), demonstrations by the teachers (25%) or by the students (21%). This data of the video analysis is consistent with the data of the teacher questionnaires: Teachers responded that they are dedicated to a more student-oriented instruction. They try to simplify complex facts for

the students in order to let them discover physics principles on their own, instead of seeing them simply as receptive learners.

The role of content in inquiry-based science lessons: An analysis of beliefs and enactment among two samples of US teachers
Erin Furtak, Max Planck Institute for Human Development, Berlin, *Germany*
Alicia Alonzo, University of Iowa, *USA*

The TIMSS Video Study found that 8th grade science lessons in the US typically involve "a variety of activities that may engage students in doing science work, with less focus on connecting these activities to the development of science content ideas" (Roth et al., 2006, p. 21). Our prior work (Alonzo, 2002; Furtak, 2006) indicates that teachers' views of inquiry are often inconsistent with accepted definitions and that these views may interfere with students' acquisition of science content knowledge. We hypothesize that a possible explanation for the TIMSS Video Study results may be interpretations of inquiry-based teaching by US teachers that exclude responsibility for helping students to develop conceptual understanding from their role. This paper presents the results of an analysis of two small datasets, in which we explored science teachers' beliefs about the role of content in inquiry-based teaching, and looked at evidence for how these beliefs were carried out in their classroom instruction. Our findings indicate that teachers who interpret scientific inquiry teaching as 'withholding answers' are more likely to de-emphasize content in inquiry-based lessons. This result seems supported by the often accompanying view that what is important for inquiry is the use of hands-on materials because students will learn from the materials, rather than any active involvement on the part of the teacher.

Opportunities for scientific inquiry in German Physics Classrooms – A case-based analysis
Mareike Kobarg, IPN - Leibniz-Institute for Science Education, *Germany*
Tina Seidel, IPN - Leibniz-Institute for Science Education, *Germany*
Manfred Prenzel, IPN - Leibniz-Institute for Science Education, *Germany*

Students all over the world are required to gain a basic level of scientific literacy to participate in the fast changing societies they live in. International science educators emphasize the role of opportunities for scientific inquiry in the classroom with regard to its possible benefits for students' development of scientific literacy. Results from the TIMS 1999 Science Video Study indicate that scientific inquiry only plays a minor role in international science classrooms. In the IPN Video Study in physics instruction the approach of the TIMS Video Studies was enriched by further in depth analysis of teacher-student-interactions. Challenging teacher questions and experimental seatwork phases that provide students with choices are considered opportunities for scientific inquiry in this study. Since aggregated data from the IPN Video Study indicate a lack of opportunities for scientific inquiry, case-based analyses are used to supplement these findings. Even though challenging questions are seldom in German physics classrooms, the case analyses give insights into the different use of those questions by different teachers. Choices for students work in experimental seatwork phases are scarce in the investigated classes. If the teachers provide choices for students the case analysis display different strategies of scaffolding the scientific inquiry initiated through those choices. To summarize the in depth analyses show that the sheer appearance of certain aspects that could provide opportunities for scientific inquiry does not guarantee the students engagement in scientific inquiry, but the role of those opportunities in the course of a lesson has to be taken into consideration.

C 12
29 August 2007 08:30 - 10:30
Room: 7.14
Symposium

Understanding understanding as an interactional matter

Chair: **Timothy Koschmann,** Southern Illinois University, *USA*
Organiser: **Timothy Koschmann,** Southern Illinois University, *USA*
Discussant: **Roger Säljö,** Department of Education, Göteborg University, *Sweden*

Understanding and how it is produced are central issues for research in education, but these matters have also been a long-standing focus of interest in the social and communicative sciences. For example, in an early essay Moerman and Sacks (1988) posed the following series of questions: What forms of social organization secure the recurrence of understanding among parties to conversation, the central institution of language use? What forms of social organization get participants to occasions of talk to do the work of understanding the talk of others in the very ways and at the very times at which they demonstrably do that work? And what are the understandings which those forms secure? (p. 182) Moerman and Sacks argued that these questions might to some degree be addressed by carefully studying how turns within a conversation are actually organized. In his lectures and subsequent writings, Sacks demonstrated precisely how such studies might be conducted. But understanding how participants competently and routinely manage turns at talk represents only one facet of how understanding is produced. Considerable terrain remains to be explored. To do so, several important questions must be taken up. What are the basic organizational features of doing an understanding? How would we go about actually studying these features? And most critically, what does it actually mean to 'have an understanding' or, stated more plainly, how is having an understanding to be understood? These questions are strongly connected to old and contentious issues in western philosophy and social theory. This panel will address them empirically by presenting a series of analyses of understandings produced in concrete settings. References Moerman, M., & Sacks, H. (1988). On "Understanding" in the analysis of natural conversation. In M. Moerman (Ed.), Talking culture: Ethnography and conversation analysis (pp. 180-186). Philadelphia, PA: University of Pennsylvania Press.

Embodying understanding: Training and the body in clinical situations
Jon Hindmarsh, King's College London, *United Kingdom*

This paper is concerned with the interactional organisation of real-time, co-present clinical training in dentistry. One dimension of these clinical environments is that they entail an intriguing tension between issues of teaching and learning and of the safe delivery of dental care - whilst they are training environments the students are providing care to real patients. The paper explicates the organisation of interaction during moments when supervisors inspect the quality of the clinical assessments made by students and indeed the dental work they undertake. These activities are routinely organised through a collaborative viewing and discussion of the (work in the) patient's mouth. These episodes are critical as they provide ongoing assessment of students' work and provide the basis for discussions of how to initiate or progress the treatment plan. This study explores the interactional management of these collaborative viewings to consider the ways in which tutors, students and patients order the work of teaching and learning. The paper takes particular interest in the ways in which displays of understanding are organised through bodily conduct just as much (and sometimes rather than) verbal conduct. It considers how these displays

by students and by patients are designed, organised and attended to and it is based on the analysis of audio-visual recordings of naturally-occurring training episodes within one clinical unit in a major UK dental school. The presentation will focus on the detailed analysis of a series of data extracts drawn from the wider corpus of recordings and the analytic orientation of the paper is drawn from ethnomethodology and conversation analysis.

Understanding and formulations of understanding in their interactional sequences: Students carrying out structured tasks in higher education
Oskar Lindwall, Göteborg University, *Sweden*
Gustav Lymer, Göteborg University, *Sweden*
Jonas Ivarsson, Göteborg University, *Sweden*

In investigating students' conduct in carrying out didactical tasks, it is notable that understanding, as the ability to go on, and utterances, such as "we get it" or "shouldn't we go on," are related in interesting ways: formulations of understandings become part of the same practices and have consequences for how the students continue. In the paper, we explore three kinds of circumstances where formulations of understanding and the ability to go on are central. First, we investigate some episodes where students formulate that they understand and are able to go on. In the investigated sequences, the students use different formulations as interchangeable criteria for justifying their "moving on," thereby highlighting what they make themselves accountable for. Second, we address some episodes where the students express that they do not understand. In the investigated courses, the students continuously exclaim, "I don't get it" when they are unable to go on. In calling the teacher's attention, this utterance also works as a common request for help. While the possibility of asking a question about what one yet does not know is sometimes seen as a paradox, this request, framed by students solving a particular assignment, can be used by the teacher, in the responsive work with the students, to formulate answers to the questions the students where unable to ask themselves. Third, we focus on some sequences where the teacher explicitly addresses the students' understanding. Formulations of understanding in these cases have other interactional consequences than sequences where the students agree that they understand. Instead of deciding that they are able to go on with a new assignment, the students become responsible for showing their understanding in certain ways. This highlights how the subject matter is inherently unstable to the criteria by which one might judge someone's grasp of it.

Understanding understanding as an instructional matter
Douglas Macbeth, Ohio State University, *USA*

This paper begins with an incautious review of certain 'facts of history' that have shaped educational research in the American context in such a way as to render our Panel's title an odd or unfamiliar formulation. Its novelty lies in the play of 'understanding' twice. 'Understanding understanding' shows a sequence of different enactments of understanding. The first is ours: the understandings of a professional research community. The second—its object—is theirs, or the understandings of ordinary worlds, persons, tasks and occasions. The former, of course, animate the entire corpus of educational research and social science. The latter, however—that and how ordinary worlds understand, and do so on any actual occasion—has no topical precedent in the educational research literature. We have never formulated the practices of understanding. We have never treated understanding as a practical task of ordinary social worlds, including the worlds of classrooms. This paper aims to foreground this lacuna, suggest something of its genealogy, and then proceed to an analysis of some classroom exhibits to show how understanding is in the first instance a practical task and routine achievement, without whose achievements the work of

classrooms and classroom instruction would be unimaginable. The classroom materials will suggest both the unremarkable diversity and the actionable bases of understanding in classroom instruction. The paper further aims to show that the work of understanding—both its first work in the world and our disciplinary study of it—is work for which psychology has no particular purchase. The understanding we aim to understand is the work of a deeply social world, played out on the surfaces of social action, overwhelmingly talk–in–action, or, as our panel's title suggests, interaction. Informed by prior work in ethnomethodology and sequential analysis, the paper recommends a praxiological understanding of understanding, in classroom instruction and elsewhere.

Reference in explanation: An aspect of prenatal examinations in Japanese obstetric settings
Aug Nishizaka, Meiji Gakuin University, *Japan*

This study is part of a larger body of research currently underway, concerning ways in which references to the uterine or fetal conditions are accomplished in Japanese obstetric settings, clinics or "midwife houses". I focus on the explanations, given by medical providers, obstetricians or midwives, to pregnant women, of what they perceive, visually or tactilely, particularly, those explanations given during the on-going examinations, of what is being done and perceived in and through these very examinations. Those explanations require reference to pregnant women's relevant internal body parts or fetal body parts. I explore how reference to a uterine or fetal part is achieved in the course of explanation of what is being perceived or done. Through the detailed analysis of interaction between medical providers and pregnant women in prenatal examinations, it is revealed how reference is lodged in the normative organization of the ongoing action sequencing, particularly, the organization of "explanation sequence" in prenatal examinations in the environment equipped with a specific device, an ultrasound scanner. I show that reference must be accomplished in ways appropriate to the current status of the on-going activity, such as a prenatal examination. The variety of reference originates from different compositions that each utterance in each sequence takes and different positions that each utterance occupies in the multilayered organization of action sequencing. The understanding of the current explanation is always an interactional achievement, insofar as it depends on the success of references in the current explanation sequence and actual action sequences must be organized depending on all the contingencies in interaction.

Understanding as participation
Alan Zemel, Drexel University, *USA*
Timothy Koschmann, Southern Illinois University, *USA*

Interactional approaches to 'understanding' as a matter of analytical interest provide a powerful alternative to cognitivist models of mind. To begin to unpack how the practical business of knowing, understanding and learning are accomplished interactionally, however, we do not need to rely on the view of cognition that treats understanding as a psychological state of the individual. When actors engage in self- or other-repair, when they produce or call on others to produce accounts, explanations, demonstrations, when they engage in correction or other forms of sense-making, they are doing the work of problematizing their ongoing achieved understanding and are also working to achieve understanding through their problematizing work. The indexical organization of understanding's work is central to the organization of our analysis. As Hanks (1992) argues, the indexical properties of social interaction locate the speaker, the referent and the recipient in a web of relationships and shared perspectives embodied in the referential work performed that also provide for the intelligibility of the referential action for the parties to the

interaction. Thus, if a person performs and participates competently and unproblematically in an ongoing activity such that the actor and other co-participants see it that way, we recognize that 'they understand what's going on.' If they do not perform or participate appropriately, we assume 'they do not understand what's going on.' Rather than make inferences about possible internal states of individuals, we argue that it is sufficient to examine in detail the actions and participation of actors where the specific participation of actors serves as their understanding. References Hanks, W. F. (1992). The indexical ground of deictic reference. In A. Duranti & C. Goodwin (Eds.), Rethinking context: Language as an interactive phenomenon (pp. 43-76). Cambridge: Cambridge University Press.

C 13
29 August 2007 08:30 - 10:30
Room: 0.100C
Symposium

Research on technology enhanced inquiry learning environments

Chair: **Zacharias Zacharia,** University of Cyprus, *Cyprus*
Organiser: **Zacharias Zacharia,** University of Cyprus, *Cyprus*
Organiser: **Ton de Jong,** University of Twente, *Netherlands*
Discussant: **Ton de Jong,** University of Twente, *Netherlands*

Inquiry-oriented learning has attracted attention as a context for implementing principles of self-directed learning, active student engagement, metacognitive regulation, and scaffolded performance. There is a growing body of evidence that technology enhanced learning (TEL) environments could offer support for inquiry aiding students in the processes of formulating investigations intended to create new knowledge and understanding. However, there are many challenges concerning the facilitation, implementation, monitoring, and assessment of inquiry oriented TEL that still need to be addressed. The purpose of this symposium is to showcase research work, both more theoreticcal and experimental that addresses these different challenges. The first paper addresses issues related to the facilitation of multiple contemporaneous graphical formalisms in inquiry learning and their impact on learning outcomes. The second paper addresses issues related to the facilitation of high quality scaffolds in inquiry oriented TEL learning environments to support students in an important aspect of inquiry learning: asking questions. The third paper addresses issues related to the (intelligent) monitoring and assessment of the steering competence of students within an inquiry oriented TEL environment for a business simulation. The fourth paper seeks to identify and assess different elements of inquiry within the context of a computer-based modelling approach in elementary school science, namely, argumentation, analogical reasoning and mechanistic reasoning. The fifth paper addresses issues related to the implementation and enactment of an inquiry oriented TEL through modelling and its impact on students' conceptual understanding. In the symposium we will discuss the current trends in research-based design of computer based inquiry learning environments.

Multiple contemporaneous graphical formalisms in inquiry learning environments: a blessing in disguise?
Erica de Vries, Pierre-Mendes-France University, *France*

Whereas numerous studies in learning focus on comparisons between representational systems, such as texts, images, graphics, and equations, few address different ways of representing within a particular representational system. The latter type of comparison is likely to become important in inquiry learning environments since they rely on different graphical formalisms, which rest on a set of limited graphical elements, to support learning activities such as exploration, modelling and collaboration. These graphical formalisms are both contemporary and contemporaneous: contemporary in the sense of "modern", i.e. designed recently in comparison to regular domain representations, and contemporaneous in the sense of "coexisting". In fact, there is as yet no universal set of correspondence rules that associates the relatively limited set of graphical elements, such as rectangles, arrows, lines, circles, diamonds, clouds, etc., to the relatively large set of conceptual elements, such as variables, relations, rate of change, resource, time, etc. Curiously, there seems to be little interest in the question whether learners' quasi-simultaneous use of multiple graphical formalisms would be a blessing (modelling activities are independent of a particular graphical formalism), or a tragedy (multiple graphical formalisms are confusing) for learning. In order to develop a theoretical stand on this issue, we study similar issues from semiotics and artificial intelligence. We will give examples from our work on student modelling in the energy domain.

An analysis of students' spontaneous computer-mediated questioning: A step toward the design of ecological supporting tools for inquiry learning environments
Minna Puustinen, University of Poitiers & CNRS, *France*
Daniele Coquin, University of Poitiers & CNRS, *France*
Josie Bernicot, University of Poitiers & CNRS, *France*

Questioning and experimentation are essential parts of all inquiry learning. However, adopting such an autonomous posture towards learning is not easy. Therefore, designers of inquiry-based learning environments should pay particular attention to the quality of the tools destined to support students in their learning. In this paper, we argue that the first step toward the design of high quality (i.e., ecological, efficacious, and user-friendly) supporting tools should be the analysis of students' spontaneous question asking addressed to a human tutor in a computer-mediated learning situation, allowing us to see what, when, and how do students really ask when they have the opportunity to formulate their requests freely. The aim of our study was thus to analyse lower secondary school students' spontaneous mathematics-related question-asking behaviour in order to provide concrete recommendations for the design of supporting tools. We used natural data, that is, the archives of a French forum providing students with individualised help in mathematics free of charge. Students may go to the forum whenever they feel it is necessary (i.e., at school during a break, at home, in the hospital, etc.) and type their messages online or else send their questions via email. Voluntary secondary school mathematics teachers take turns at answering the students' messages seven days per week except for the summer holidays. Our data consisted of the messages sent by approximately 200 French lower secondary school students over a span of 42 months. We made a detailed content analysis of the students' exercises, the context within which their messages were sent, their requests for help, and the partial answers provided by some of the students. The results permitted us to formulate recommendations for the design of supporting tools.

Approaching steering competence within web-based enterprise simulations
Klaus Breuer, Johannes Gutenberg-University Mainz, *Germany*
Rene Molkenthin, Johannes Gutenberg-University Mainz, *Germany*

In the context of web-based enterprise simulations there is the issue of how to foster learning for the objective of steering competence. Effective feedback which is to support such self-regulated learning processes requires a continuous diagnosis of the inquiry and the decision-making activities which are necessary components within the steering process of a(n) (simulated) enterprise. From an educational perspective the notion of how to support the elaboration of the mental model used as a reference system for the inquiry and decision-making processes during a simulation run is of relevance. The overall aspect is how the relevant information is retrieved by a participant and how this information is used in controlling the enterprise. Our paper reports and reflects on the diagnostics within a prototype of a web-based business simulation labelled solarSYDUS. Besides the necessary enterprise and market model this simulation comprises a component for recording information-retrieval and decision-making processes during the simulation for analyzing individual steering processes. An overall objective is the development of a model of steering competence within business processes. This covers the problem-solving abilities of a participant as well as the knowledge and strategies within business contexts needed to control an enterprise successfully. From first test runs we can present visual representations of inquiry and decision-making processes by individuals. Such representations make use of time-event matrices, which have been introduced by Streufert and co-authors within the framework of the Strategic Management Simulations.

Nascent student inquiry in the elementary science classroom: The case of modeling combined projectiles and relative motion with Stagecast Creator
Loucas Louca, University of Cyprus, *Cyprus*
Zacharias Zacharia, University of Cyprus, *Cyprus*
Constantinos Constantinou, University of Cyprus, *Cyprus*

This paper describes a video case study, analyzing a series of classroom-based student conversations from a science after-school elementary club during which students developed computer-based models of physical phenomena. Our purpose was to identify and describe in detail the different elements of student scientific inquiry as well as the context in which they took place. Despite decades of calls for promoting inquiry in the elementary grades, the agenda has yet to establish valid instructional practices for several reasons that include disagreements over what is important about inquiry, what productive inquiry entails, and which learning context is supportive for productive student inquiry in science. Using previously developed coding of authentic classroom-based discourse, we analyzed a series of student conversations in a combined 5th-6th grade after-school elementary club in the context of developing models of a combined projectile and relative motion using Stagecast Creator. Our focus was on three elements of student inquiry: argumentation, analogical reasoning and mechanistic reasoning. Findings suggest that prior to any formal instruction, these students had a repertoire of abilities for mechanistic or analogical reasoning and argumentation which are activated depending on the context. In terms of analogical reasoning, students were able to generate analogies as well as validate and evaluate the relevance of those analogies. In terms of argumentation, they were able to make claims and support them by grounds providing relevant everyday experiences. In terms of mechanistic reasoning, students talked about the phenomenon's entities, their properties and organization, as well as processes that produce change in the phenomenon. The use of Stagecast Creator to develop models of the phenomena seemed to support a number of elements of student inquiry such as moving from

observation/experiences to inventing mechanisms, making use of the mechanisms to make predictions and validating the mechanisms through prior experience.

Enacting inquiry through modeling: The added value of two modeling-based approaches in the development of student understanding of ecosystems
Marios Papaevripidou, University of Cyprus, *Cyprus*
Constantinos Constantinou, University of Cyprus, *Cyprus*
Zacharias Zacharia, University of Cyprus, *Cyprus*

This research study is grounded in contemporary perspectives on learning science as inquiry and builds upon previous research findings pointing to the significant role of modeling-based instruction in fostering and supporting conceptual understanding in specific knowledge domains. We have designed and implemented two modeling-based curricula for fifth graders. Our teaching aimed at enhancing students' conceptual understanding about ecosystems. Three constituent components, identified through previous research, are thought to shape student understanding: basic needs of living organisms, interdependence, and ecological balance. A pre-post comparison study design was used, which involved two groups. The first group (n=16) received an explicit modeling-based instruction that combined the construction of paper-and-pencil representations and the iterative development of computer-based models (CBM group). The second group (n=17) received an implicit modeling-based instruction that combined the construction of paper-and-pencil representations and the iterative design of a role-playing game (RPGM group). The role playing games took the form of run and chase games where the students were assigned predator and prey roles in a pre-determined space which they formulated with objects representing plants. All the models constructed throughout the two instructional approaches aimed at representing and interpreting a specific marine ecosystem as observed through a video documentary. Paper-and-pencil tests were administered both before and after the interventions in order to assess the development of the conceptual understanding about ecosystems of the participants. The data were treated both qualitatively and quantitatively. The findings of the study indicate that the CBM group outperformed the RPGM group regarding the development of the concepts of interdependence and ecological balance, whereas the two groups were found to be equal in terms of the development of understanding of the concepts that refer to the basic needs of living organisms.

C 14
29 August 2007 08:30 - 10:30
Room: 0.79 Jánossy
Symposium

The identification and assessment of metacognition in young children

Chair: **Gerhard Büttner,** University of Frankfurt, *Germany*
Organiser: **David Whitebread,** University of Cambridge, *United Kingdom*
Discussant: **Marcel Veenman,** University of Leiden, *Netherlands*

Research on metacognition has predominantly adopted methodologies relying on the verbal abilities of participants or on their declarative metacognitive knowledge. These methodologies are now generally accepted to under-estimate the metacognitive capabilities of young children (Winne

& Perry, 2000; Whitebread et al, 2005). This symposium contains four papers reporting the identification and assessment of metacognition in young children using innovative methodologies which reveal that emergent metacognitive abilities are identifiable in young children and are related to their performance on a range of tasks. The first paper reports a study of 'judgement-of-learning' performance among 3-6 yr olds. Children were asked to judge their ability to recall the second of an associated pair of pictures immediately after seeing them, or 2 minutes later. The findings revealed the existence of the delayed JOL effect in children from the age of 4 yrs. This indicates a shift in monitoring competencies between three and four years of age. The second paper reports the identification and analysis of non-verbal indicators of metacognitive processes in observational data of 3-5 year olds in English educational settings. A transition from more non-verbal to more verbal indicators through this age range is revealed and discussed. The third paper discusses the conceptual and functional relationships between early executive functioning and metacognitive processes, and reports some initial ERP studies of inhibition in a numerical Stroop task with children in the 7-10 age range. These initial findings support the utility of this methodology in separating out the effects on performance of cognitive and metacognitive abilities. The final paper reports the use of an innovative measure of metacognitive knowledge (MCK) in an investigation of its relation with reading comprehension (RC) skill across the first three school years. The findings indicate a strong relation throughout this age range between metacognitive knowledge and reading comprehension.

Young children's metacognitive competencies in a judgment-of-learning (JOL) task
Gerhard Büttner, University of Frankfurt, *Germany*

Self-regulation requires metacognitive competencies in planning, monitoring, controlling, and evaluating. According to model of procedural metacognition developed by Nelson and Narens (1994), monitoring one's own learning process allows the learner to assess the current state of mastery of a given item and to predict future memory performance. Depending on the judgment of learning (JOL), either more study time is allocated to the item, or the learning process is finished. Earlier studies with adults have shown that the accuracy of judgments of learning depends on the time elapsed between the learning process and the JOLs. Typically, delayed JOLs are more accurate than immediate JOLs (delayed JOL-effect). Recently, it has been shown that the delayed JOL-effect can be observed in elementary school children as well as in six year-old kindergarteners. The aim of this study was to extend our knowledge about monitoring competencies in a JOL-task for younger children. Children in three age groups (three, four and six years old) had to learn paired associate pictures. Either after learning each pair of pictures (immediate condition) or after learning the total list of pairs (delayed condition) the children had to predict the retrieveability of the second picture of a pair two minutes after finishing the learning procedure when prompted with the first picture (judgment of learning). In a second task the children had to judge the difficulty of learning material. The metcognitive competencies of the three year-old children were very poor. In contrast, the four-year-old as well as the six-year-old children had a better prediction of memory performance in the delayed condition. Moreover, they were sensitive to the difficulty of learning material. Thus, the findings indicate a shift in monitoring competencies between three and four years, and that the development of an important component of self-regulated learning begins very early.

Non-verbal indicators of metacognition in young children
David Whitebread, University of Cambridge, *United Kingdom*
Deborah Pino Pasternak, University of Cambridge, *United Kingdom*
Claire Sangster, University of Cambridge, *United Kingdom*

A significant debate in the metacognition literature concerns the extent to which metacognitive processes must be conscious and amenable to verbal articulation (Veenman et al, 2006). This is a conceptual issue, but one which also inter-relates very significantly with methodological concerns. Predominantly, metacognitive processes have been investigated by verbal means – for example, interviews, self-report questionnaires and think-aloud protocols – which, a priori, exclude unconscious and non-verbal processes and behaviours from consideration. There is also evidence to suggest that these language-based methodologies under-estimate the metacognitive capabilities of young children (Whitebread et al, 2005). It is also argued here that a definition of metacognitive processes which excludes unconscious or non-verbal processes and behaviours is unhelpful and misleading. Recent work on the role of gesture in conceptual learning and strategy development (Goldin-Meadow, 2002; Pine, Lufkin & Messer, 2004), for example, suggests that conscious articulation is only a part of the process of development in these areas. This paper, therefore, reports the identification and analysis of non-verbal indicators of metacognition in young children within naturalistic observational data. This data was collected within a 2 year study exploring the development of self-regulatory and metacognitive abilities in young children (aged 3-5 years) in educational settings in the UK (English Nursery and Reception classrooms). 32 early years educators collected evidence of metacognitive abilities evidenced by children in their classes during learning activities which were constructed to be 'meaningful' for the children and in other ways most likely to provoke metacognitive or self-regulatory behaviours. Gestures and other non-verbal indicators appeared most prevalently in the area of cognitive regulation. These included indicators of monitoring, error-correction, controlling attention, planning and goal-directed behaviour. The paper will present evidence of the relative incidence of these behaviours in the 3-5 age range, and discuss their significance for theories of metacognitive development.

Event-related potentials enable the real-time follow-up of response-inhibition processes in children
Dénes Szűcs, University of Cambridge, *United Kingdom*
Fruzsina Soltész, University of Cambridge, *United Kingdom*
David Whitebread, University of Cambridge, *United Kingdom*
Valéria Csépe, Hungarian Academy of Sciences, Budapest, *Hungary*
Donna Bryce, University of Cambridge, *United Kingdom*

The present paper reports initial studies which are part of a larger project aiming to examine the relationship between behavioural and neurophysiological measures of executive functioning, and behavioural measures of early metacognitive skilfulness in children in the 3-9 age range. The paper addresses particularly the utility of the electrophysiological methodology of event-related potentials (ERP) in the measurement of inhibition in 7-10 year old children. It is argued that executive functions such as inhibition are functional precursors of metacognitive processes and that ERP can make a significant contribution the undestanding of their development, as behavioural measures are not adequate to distinguish the contribution of executive functions to performance. The initial studies reported in this paper suggest that, at least in numerical processing, the basic cognitive processes (here related to numerical magnitude recognition), at what Nelson & Narens (1990) have described as the 'object' level, occur as fluently in children as in adults. However, the slower performance of the children compared to adults resulted from

immature executive processing, at Nelson & Narens' 'meta' level , including the monitoring and co-ordinating of the behavioural response. The potential for electophysiological studies to help us understand the emergence and significance of executive functioning in young children, and their relationship to the early development of metacognitive processes and abilities, would seem to be supported.

Developmental dynamics of metacognitive knowledge and reading comprehension skill in young primary school children
Tiina Annevirta, University of Turku, *Finland*
Eero Laakkonen, University of Turku, *Finland*
Riitta Kinnunen, University of Turku, *Finland*
Marja Vauras, University of Turku, *Finland*

The aim of this study was, firstly, to explore the development of primary school children's metacognitive knowledge from preschool to the 2nd grade and the development of reading comprehension skill from the 1st grade to the 3rd grade. Secondly, the developmental dynamics between metacognitive knowledge (MCK) and reading comprehension (RC) skill across the first three school years were investigated. The longitudinal sample included 181 children who were tested three times from preschool spring to the spring term of the 3rd grade using an identical set of measurements: the Metacognitive Knowledge Test and Reading Comprehension Test. In studying developmental change using Latent Growth Curve modelling (LGC), no uni-construct effect for the development of MCK or for RC skill was found. However, a multi-construct cumulative cycle between the children's MCK and RC skill was identified. Thus, it may be interpreted that the more the children's MCK developed from preschool to the end of the 2nd grade, the better RC skill they showed during the first three school years.

C 15
29 August 2007 08:30 - 10:30
Room: 4.95
Symposium

Re-examining disciplinary specificity in university teaching and learning

Chair: **Paul Blackmore,** University of Coventry, *United Kingdom*
Organiser: **Denis Berthiaume,** University of Lausanne, *Switzerland*
Discussant: **Sari Lindblom-Ylänne,** University of Helsinki, *Finland*

Issues of disciplinary specificity in university teaching and learning have been researched for some time now. Over the years, a significant body of research has focused on the specific characteristics of university disciplines. This field of research has focused on disciplinary epistemologies and has generated models for understanding teaching and learning from 'within' the disciplines It has also generated a more normative or prescriptive literature on how certain disciplines should be taught or learned at the university level. In more recent years, lines of research previously considered separately began influencing the thinking on disciplinary specificity. For instance, issues of personal epistemology in learning and teaching have been linked with issues of disciplinary specificity. Other studies have emphasised factors beyond the structuralist

understandings of the discipline captured in much of the literature by drawing attention to the context in which a discipline is taught, and the 'constructed' nature of disciplines. Therefore, in light of recent developments in research on learning and teaching/instruction, issues of disciplinary specificity in university teaching and learning can benefit from being re-examined. This symposium provides an in-depth examination of issues of disciplinary specificity in university teaching and learning through an examination of four research projects. Those projects adopt very different perspectives on the issue, thus contributing to an expansion of our current understanding of disciplinary specificity in university teaching and learning. An introduction to the symposium will situate the four projects in the existing literature on disciplinary specificity while the discussant will identify similarities and differences among them and clarify their contribution to our understanding of issues of disciplinary specificity in university teaching and learning.

Problematizing the nature of the discipline: a socio-cultural approach to apprehending disciplines in higher education
Joelle Fanghanel, City University, London, *United Kingdom*

In this presentation, the notion of the discipline as a construct essentially reflecting knowledge structures in a specific field modelled through involvement in a disciplinary culture is challenged. Based on an empirical study which adopted a theoretical approach to teaching and learning that emphasised the importance of context, construction and ideology in the make-up of a disciplinary identity, this presentation explores constructions of the disciplines by higher education teachers. Much of the research concerned with discipline epistemologies is based on Biglan's distinction between soft-hard and pure-applied disciplines, and presents the discipline as a coherent unit of analysis, arguing for example that there are 'signature' pedagogies attached to specific disciplines. It is argued in this paper that the epistemological dimension, though important, is insufficient in accounting for pedagogical practices. In particular, it does not take into account issues of power, agency, and ideology or the structures that frame academic work. This presentation is part of a larger project which examined teaching constructs amongst academics, and established how those were shaped by (and at the same time were shaping) the context in which they worked. In this project, 18 semi-structured interviews of academics working in seven different institutions and across 13 different disciplinary backgrounds were carried out, using a dialogic approach, and a socio-cultural theoretical framework. Components of pedagogical constructs were identified in analysing the data, of which the discipline was one. I present here characterizations of the disciplines held by academics in varied fields which de-emphasize epistemological determinism in disciplinary constructs, and bring to the fore constructions that highlight the role of ideology, curricular locus, and pragmatism. Some of these constructions give a very tenuous role even to the enculturing role of the discipline.

What is the nature of university professors' discipline-specific pedagogical knowledge?
Denis Berthiaume, University of Lausanne, *Switzerland*

This research project investigates the nature of university professors' discipline-specific pedagogical knowledge (DPK). Traditionally, DPK has been examined with the help of constructs from two distinct lines of research: the knowledge base for teaching and disciplinary specificity in university teaching. Yet, the two lines of research have seldom been combined to explore DPK. Furthermore, linkages between those two lines of research point to the potential contribution of research on personal epistemologies. Therefore, the aim of this research is to describe empirically the phenomenon of DPK using constructs from those three lines of research. The research project takes the form of an instrumental multi-case study of four university professors from four

disciplines. Each professor was interviewed five times, thus providing insight into their thinking about teaching, their discipline and knowledge in general. Transcripts were analysed using a mixed a priori/emerging coding scheme. The analysis of data led to the identification of components and dimensions of DPK corresponding to constructs from each of the three lines of research. Simultaneously, the analysis led to the identification of relationships between those components and dimensions. As such, the findings provide a framework for the interpretation of university professors' DPK. Furthermore, the analysis led to the identification of components, dimensions, and relationships common to the four professors, thus providing information about elements of DPK that are likely to be found in most university professors. Overall, the findings provide an empirical description of university professors' DPK that captures the phenomenon more accurately than previous approaches. Therefore, from a theoretical standpoint, it furthers our understanding of the struggles faced by university professors in reconciling their pedagogical and disciplinary knowledge. From an educational standpoint, it points to specific aspects of the experiential learning of university professors that need to be supported by academic development efforts.

Academics as creators of imaginary subjects: Academics' ideas of their disciplinary curriculum decision – making
Gudrun Geirdottir, University of Iceland, *Iceland*

An important aspect of higher education is university teachers' freedom and power to make curriculum decisions; to decide what students are to learn and how. In this study, Bernstein's theories on the different fields of reproduction of knowledge as well as his concepts of classification and framing are used to explore academics' conceptions of the pedagogic discourse of their discipline. According to Bernstein, the pedagogic discourse selects and creates specialised pedagogic subjects through its contexts and contents (Bernstein, 2000, p.31) and is composed of instructional as well as regulative discourses. The aim of the study is a) to probe in this light the academics' conceptions of these discourses within their disciplines and b) their participation in re-contextualising disciplinary knowledge as an academic subject of study for students. The notions academics have of the pedagogic discourse, its creations and effects is here taken to be situated in different social contexts, most importantly the discipline but also the department, the institution, and the profession. The study uses qualitative research methods. Data is collected through observations at staff meetings and in-depth interviews with academics in three different disciplines at the University of Iceland (anthropology, physics and mechanical and industrial engineering) chosen partly with reference to Biglan's dimensions of soft-hard and pure-applied disciplines. Text analysis of various documents related to the curriculum construction of the different disciplines was also carried out. Data is analyzed through formal data structure and discourse analysis. The study is still in progress but findings can be classified according to disciplines that differ significantly even tough there are some very common threads across them. In particular it was found that even within disciplines academics hold disparate views with regard to the construction of the pedagogic discourse and refer to different categories (institutional, personal, historical) for its justification.

Re-disciplining generic attributes
Anna Jones, University of Melbourne, *Australia*

Generic attributes have, for a long time, been viewed as super-disciplinary and hence as separated from or overlayed onto disciplinary content. There has been considerable interest in generic skills or attributes over more than a decade and there has also been interest in disciplinary specificity in

teaching and learning and yet there has been little research to date that has examined the importance of disciplinary epistemology in shaping generic skills. The study reported in this paper brings together these two strands of the literature. The findings of this study demonstrate that generic attributes are highly context-dependent and are shaped by the disciplinary epistemology in which they are conceptualised and taught. This study examined the teaching of generic skills in five disciplines, physics, history, economics, medicine and law in two Australian universities. The data is in-depth, semi-structured interviews with a total of 37 academic staff. It found that skills such as critical thinking, analysis, problem solving and communication are conceptualised and taught in quite different ways in each of the disciplines. This paper suggests that a de-disciplined approach to generic skills has led to shortcomings in the areas of educational policy and teaching practice. Instead it proposes a re-disciplined theorising of generic skills, which frames them as part of the social practice of the disciplines and so understood as in and of the disciplinary culture.

C 16
29 August 2007 08:30 - 10:30
Room: 7.59
Symposium

Science and mathematics education as enculturation

Chair: **Wim Jochems,** Eindhoven School of Education, *Netherlands*
Organiser: **Ruurd Taconis,** Eindhoven School of Education, *Netherlands*
Discussant: **Jan van Driel,** Leiden University, *Netherlands*

Science and mathematics education can be seen as a process of enculturation. From this perspective, key-issues in science and mathematics education emerge as problems in introducing novice students effectively into the subcultures of science and mathematics. For example: the aims of science and mathematics education, the low participation in science education in western industrialised countries, the vast difficulties of many students in learning about scientific concepts, and issues concerning cultural minorities and science. A metaphor for education as enculturation is that of 'crossing a bridge that spans a river separating two countries'. Education is to provide a safe and practicable route for learners to travel from their own country (cultural background) into science&mathematics-country. They may decide to turn back or to stay in science-country more permanently. In that case, the learner's identity will be enriched in a constructive response to the culture of science and mathematics. Participation appears to play a key role in enculturation. The acquired knowledge and skills will be personally embedded and intertwined with cultural elements such as: language, assumptions, values, epistemology and social and communicative codes. On the level of the individual, various problems can occur that may hinder learners to enculturate. Some of these problems are related to the cultural background of the learner. Individuals differ and are part of different sub-cultures each of which may comprise elements contradicting science or mathematics culture. Other problems seem primarily related to the culture of science or mathematics itself which appears to hold contradicting elements. Such problems partly overlap with problems arising from the educational system and the way it represents science and mathematics. The contributions in this symposium focus on these three kind of problems and explore the relevance and advantages of the enculturation perspective.

Enculturation and the apparent incompatibility of religion and the theory of evolution
Mariska Schilders, Fontys University of Professional Education, *Netherlands*
Kerst Boersma, Centre for Science and Mathematics Education, *Netherlands*
Peter Sloep, Fontys University of Professional Education, *Netherlands*

Evolution is one of the central and structuring themes in biology yet some students are reluctant to accept the notion of evolution because they feel it contradicts their religious beliefs. Enculturation in the culture of biology as represented in education could cause conflicts, since the concept of evolution has different meanings in a daily life culture and in the culture of biological education or research. Therefore, a learning and teaching strategy was developed to facilitate students and teachers to discuss in meaningful and productive ways their knowledge on evolution in their daily lives and within the culture of the biology classroom. Design research was used to develop and examine the learning and teaching strategy. The first version of the strategy was developed on the basis of a review of literature and an empirical preliminary investigation. Learning and teaching materials were developed in close cooperation with teachers. These materials were tested in different classrooms. The findings of this first cycle of developing and testing leads to a revision of the learning and teaching strategy that will be retested in a second and third cycle; etc. Empirical findings from a preliminary investigation on the first learning and teaching strategy indicate that it is important to explain the different positions towards evolution and religion, in order to show the variety of opinions present in our society. Besides, it appears important to explain the difference between scientific arguments, religious argument, and non-scientific arguments, in order to teach students that religious arguments are not used in the scientific culture but only in their daily life. To address their daily life culture it seems necessary that students explore and substantiate their own philosophies towards evolution and religion; to that end they need to learn to use scientific and (when present) non-scientific arguments to justify their position

Changes in the meaning of mathematical correctness during the enculturation of graduate students in physics: conflicts and tensions
Mario Natiello, Centre for Mathematical Sciences, Lund University, *Sweden*
Hernan Solari, Departamento de Fisica, Facultad de Ciencias Exact, *Argentina*

The starting point of our research is the detection of a small but relevant and alarming, frequency of reviewed works published in high standard journals of physics that present "evident" (basic) and invalidating mathematical mistakes. Such mistakes go unnoticed by referees and even worse; these works are subsequently quoted as correct results by other practitioners. We interpret this as an indication that problems arise along the enculturation of science students and in the way some sub-communities of physicists use mathematics. By "evident" we mean that science students are instructed in the use of simple metacognitive tests to detect such basic errors. Our thesis is that during enculturation of science students, the notion of what is mathematically correct, and what is not, is adapted to the practice within a local group, effectively producing blind spots and contradicting earlier learning in mathematics. The implementation goes in part through a hidden curriculum: The "official view" of what is mathematically correct remains essentially unmodified, but "in practice" different criteria become dominant. This process, which does not stay completely unnoticed by the students, is a source of conflict since the social condition of the graduate students in the scientific culture makes critical-independent thinking a high-risk policy. We explored the features of this process by asking a small group or (anonymous) Ph D students in science and engineering all over the world. Unexpectedly, the study reveals that, with respect to correctness, the enculturation process is facilitated by "early authoritarism" (truth descends from authority) in graduate courses. We show some evidence of attempts by "local" groups (focalised sub-

communities in science) of early introduction of their own particular substitutes of mathematical logic (analogy, manipulations of symbols and/or almost-magical invocations) during the education phase (undergraduate studies) in an apparent attempt to avoid the conflicts emerging in the enculturation process.

Enculturation in mathematics: Shifts in students' view and attitude
Jacob Perrenet, Eindhoven University of Technology, *Netherlands*
Ruurd Taconis, Eindhoven School of Education, *Netherlands*

The main aims of this study are to investigate the change in mathematical attitude of mathematics students during their study years and their explanations of these changes. The mathematical attitude is measured when they start their Bachelor and again when they nearly complete it. The students are asked to explain their personal shifts in attitude. The mean shifts over four consecutive generations are analyzed over the group as a whole and compared with the attitude of their University teachers. The change in student attitude appears to be in the direction of the professional attitude: they tend to perform more metacognitive actions, they have become more of the opinion that problems can be solved in various ways, they tend to read more precisely through a problem's givens beforehand, and they tend to formulate more precisely. The students explain these shifts mainly by the specific nature of the University math problems compared with school problems. In school answers had to be precise numbers. At University precise answer is not always possible, and the method of solution is more important. Also, the students have discovered that at the University hard work is necessary to acquire insight and that mathematics is not a completed body of knowledge. The changes in attitude can be seen as enculturation into the mathematics subculture. In The Netherlands the interest in studying mathematics has decreased dramatically. The enculturation hypothesis poses that education does not succeed in bridging the gap between the culture of mathematics and the culture of secondary school students. This study shows that secondary education has shown an impoverished image of the real mathematical culture. It is advised to present a more authentic image of professional mathematics in secondary education.

Does science suit me? How perceived cultural prototypes influence students' commitment to a school subject
Ruurd Taconis, Eindhoven School of Education, *Netherlands*
Ursula Kessels, Freie Universität Berlin, *Germany*

In many industrialized countries, science, and especially physics, is very unpopular with students, resulting in shortage of graduates in science and engineering. In our study, we examine the impact of prototypes of science (i.e. the image of the typical person liking science or the typical science teacher) on students' liking for these subjects, and taking these subjects in upper secondary education. Self-to prototype matching theory (Niedenthal, Cantor & Kihlstrom, 1985) proposes that when taking a decision, people compare their self-image with a prototype choosing each of the options in question and eventually choose the option with the biggest similarity between self and prototype. Such, as the science prototypes possess several negative aspects and are very different from the image that students have of themselves, students tend not to enter this field (Hannover & Kessels, 2004). Our study includes data from more than 300 high-school student from The Netherlands and Germany. They completed questionnaires in which to describe both subject related prototypes (students liking the subject, teachers teaching the subject) and their image of themselves. We could show that in both countries, science related prototypes comprise negative aspects and that students feel most different from the science prototypes (compared to other

subject prototypes). Prototype matching could explain students´ subject preferences and it could be a dominant mechanism in subject picking. Hence, the lack of similarity students perceive between themselves and typical persons representing the science culture seems to be an important factor for explaining the lack of students entering science careers.

C 17
29 August 2007 08:30 - 10:30
Room: 0.100A
Symposium

Assessment that feeds the development of potentials for learning

Chair: **Olaf Köller,** Humboldt University Berlin / Utrecht University, *Germany*
Organiser: **Marja van den Heuvel-Panhuizen,** Humboldt University Berlin / Utrecht University, *Germany*
Discussant: **David C. Webb,** University of Colorado at Boulder, *USA*

Knowledge about students' understanding plays a determining role in educational decision-making and is a key for developing potentials for learning. The better assessment informs those in whose hand these decisions are, the better they can develop environments for students that offer optimal opportunities to learn. This might be true for all levels of education, but it is certainly the case when "using assessment in the process of learning" (Shepard, 2000). Black and Wiliam's (1998) international review of classroom assessment studies showed that teachers who used assessment to take instructional decisions achieved substantial raises in educational outcomes. Moreover, these gains appeared to be consistent across countries, age classes, and content areas. At the same time, the review revealed that the everyday practice of assessment in the classroom is beset with problems and shortcomings. Therefore, it is not surprising that assessment currently is still not seen as a tool for learning and that there is even a decrease of formative assessment (Segers & Dochy, 2006).The goal of the symposium is to bring together and discuss four initiatives—from four different countries, the US, Sweden, Cyprus and Germany—aimed at the further development of assessment that supports learning. These initiatives each have their own perspective, but all have in common that they focus on getting a better understanding of the students' mathematical thinking as a crucial input for the development of potentials for learning. The first contribution addresses the aspect of professional development of teachers and show how teachers can get better access to what their students think. The second one uses a multimodal approach to analyze the government-provided diagnostic materials. The other two contributions also bring in the responsibility of assessment designers and show how problems covering multiple representations and improved coding can better reveal students' mathematical understanding.

Understanding students, understanding practice: Using professional development to help teachers make instructional decisions
Roberta Schorr, Rutgers University, *USA*

This research involves a professional development project in which interacting teams of researchers, teachers, administrators, pre-service teachers and graduate students, collaborate as "co-investigators" during extended sequences of activities aimed at helping all participants to revise, test, refine and share their understanding of students' mathematical thinking. The ultimate

goal is to help students to develop deeper and higher-order understanding of mathematical ideas. All sessions make wide use of activities that employ contexts in which students can use their sense-making abilities to solve complex problems in a collaborative atmosphere. Moreover, the activities are designed so that students produce models for constructing, describing, manipulating, predicting, and controlling complex systems. Student solutions are not simply answers to specific questions; rather, they reveal many aspects of the thought process that goes into the final solution. In this way, pre and in service teachers, researchers, etc. can focus on the work that the students produce in an effort to deepen their own understanding of the mathematical content, and the ways in which students learn the content, develop and use representations, and formulate justifications and solutions of the content. When the participants examine students' work, the initial or early models that they use to make sense of the situations (e.g., to make predictions or provide explanations that guide actions such as instructional practices) may be shallow or less sophisticated versions of later models. This research will provide an analysis of the ways in which teachers revise, refine, extend, test and share their evolving models for understanding the mathematical ideas that are produced over extended periods of time, and the implications this has for classroom practice.

Multimodal aspects of assessment — Analysis of national diagnostic materials in sweden
Astrid Pettersson, Stockholm Institute of Education, *Sweden*
Lisa Björklund Boistrup, Stockholm Institute of Education, *Sweden*

This presentation addresses the use of a multimodal framework for analyzing assessment materials in general and diagnostic materials in particular. What is assessed and how an assessment is carried out influence students' learning and teachers' teaching (see for example Gipps, 1994). Consequently, an analysis of the different assessment materials in mathematics that are offered by a government is important. In our study we analyze the Swedish national diagnostic materials developed for the compulsory school. The framework for the study consists of (1) research of assessment and its influences on teaching and learning, mainly the importance of qualitative feedback (Black & Wiliam 1998); (2) the "goals to aim for" in the national mathematics curriculum (Swedish National Agency for Education, 2001); and (3) the multimodal approach. We use the multimodal approach as it is described by Kress et al. (2001). In short, this multimodal approach emphasizes that learning can be seen in a semiotic frame and that communication is considered not only from a linguistic perspective. Instead all modes of communication are recognized. Modes can be speech, writing, gestures and pictures. Each mode has its "affordances" for a person engaged in a communication (Kress et al., 2001). In our study we analyze what kind of feedback interaction the teacher and student will become engaged in when using the material. We also investigate which areas of mathematics are focused on in the material and what role different communicational modes play in the materials. In our results we will describe the differences and similarities between the various materials provided by the government. We also discuss the opportunities for the materials to be useful tools for teaching and learning.

Getting access to students' understanding of function — considering assessment in mathematics from the perspective of multiple representations
Iliada Elia, University of Cyprus, *Cyprus*
Athanasios Gagatsis, University of Cyprus, *Cyprus*

The use of multiple representations has been strongly connected with the complex process of learning in mathematics, and more particularly, with the seeking of students' understanding of important mathematical concepts. Learning to use multiple representations requires students to

understand not only each individual representation but also the relationship between representations. Passing from one representation to another is considered a fundamental process leading to mathematical understanding. This study intends to illustrate the importance of considering the ability to construct and switch between multiple representations of a concept in analyzing and assessing students' learning outcomes in mathematics. The study explores the structural organization of students' abilities in carrying out conversions from one mode of representation to another in the context of functions and the alteration of this structure with students' age. Students in grades 9 and 11 were given a test involving conversions of functions and other algebraic relations (inequalities) among verbal, symbolic and graphical representations. The Confirmatory Factor Analysis and the Implicative Statistical Method were used to analyze the data. The results show that despite the variation in students' mean performance in the conversion tasks across the two grades, a common structural model is defined for capturing their use of different representations of functions in both grades. The model highlights the significant role of the initial representation of a conversion in students' processes. Using the implicative statistical analysis, evidence is provided for the phenomenon of compartmentalization between representations in students' responses, which is indicative of their fragmentary understanding of functions. These findings draw attention to the beneficial effect of including combinations of representations and conversion tasks from more than one source-representation in the assessment tools of students' mathematical learning.

Using national assessment for getting a deeper knowledge of students' mathematical understanding

Marja van den Heuvel-Panhuizen, Humboldt University / Utrecht University, *Germany*
Alexander Robitzsch, Humboldt University, *Germany*
Dietlinde Granzer, Humboldt University, *Germany*
Olaf Köller, Humboldt University, *Germany*

It is generally recognized that an assessment that supports learning requires an alignment between assessment and the goals of education. This alignment is a real challenge when education—like in the prevailing approach to mathematics education—is aimed at bringing students to deep understanding. Therefore, assessment designers involved in mathematics education have put much effort in designing assessment tools that go beyond assessing basic skills and contain open problems that draw on higher levels of mathematical understanding. In this contribution to the symposium we like to share and discuss the results from a study into primary school students' mathematics achievements that focuses on higher-order competences such as reasoning, modeling, and smart calculating. The study is part of the ESMaG project that evaluates the national standards for mathematics in primary school in Germany. In order to assess the students' mathematical thinking the evaluation tool includes a number of open problems, which prompt the students to use higher-order competences. In addition, we developed an analytic multidimensional coding framework through which we could handle the complexity of students' responses to these open problems. This new approach to coding in a large-scale assessment turned out to be an important key to get access to the students' thinking. In our presentation we will argue that having elaborate coding systems in a national assessment can result in a more informative assessment that gives a deeper view on the students' mathematical understanding.

C 18
29 August 2007 08:30 - 10:30
Room: 0.83 Eötvös
Symposium

Epistemological beliefs and processes of learning

Chair: **Elmar Stahl,** University of Education, Freiburg, *Germany*
Organiser: **Elmar Stahl,** University of Education, Freiburg, *Germany*
Discussant: **Gale Sinatra,** University of Nevada, Las Vegas, *USA*
Discussant: **Barbara Hofer,** Middlebury College, *USA*

Over the last years, research on epistemological beliefs (i.e. beliefs about the nature of knowledge and knowing) has provided growing evidence that these beliefs are related to different aspects of learning processes. Nevertheless, due to the complexity of the construct (see e.g. the theoretical model of Buehl and Alexander, 2006), it is still largely unknown how epistemological beliefs might interact with learning processes in detail. The aim of this symposium is to present and discuss five studies exploring epistemological beliefs within different learning scenarios. These studies aid in furthering our understanding of how epistemological beliefs might be integrated within the cognitive architecture. Bromme, Pieschl and Stahl focused on early stages of the learning process and examined how epistemological beliefs affect processes of metacognitive calibration (e.g., setting of learning goals, planning of learning strategies). Boldrin and Mason studied learners' epistemic metacognition, i.e. students' processes of accessing, judging and interpreting information, when learning by surfing the Internet. Limon investigated the relationship between individuals' epistemological beliefs and their epistemological understanding along the process of gaining expertise in the domain of history. Moschner, Anschütz, Wernke, and Wagener explored whether elementary school children understood the meaning of standardized items used in common questionnaires to measure epistemological beliefs and learning strategies. Finally, Schraw, Olafson, and VanderVeldt compared the relationships among different measures of epistemological and ontological beliefs to examine whether the different measures correlated significantly in a theoretically meaningful manner. The studies will be discussed with regard to theoretical assumptions on the relation between epistemological beliefs and learning processes by Sinatra and Hofer.

Epistemological beliefs and the perception of task complexity
Rainer Bromme, University of Münster, *Germany*
Stephanie Pieschl, University of Münster, *Germany*
Elmar Stahl, University of Münster, *Germany*

It is still widely unknown how learners' epistemological beliefs, i.e. their beliefs about the nature of knowledge and knowing, might affect their learning processes and their use of strategies in detail. We investigate this issue within a comprehensive project. Based on the COPES-model of self-regulated learning (Winne & Hadwin, 1998), we devised a series of experiments tapping different stages of the self-regulated learning within a hypermedia environment on genetic fingerprinting. In all experiments we assume that more sophisticated epistemological beliefs are associated with more adequate metacognitive calibration, i.e. a better match between objective task demands such as task complexity and the individual learning process. Results from the first main experiment that focused on the preparatory stages of task definition and goal setting and planning will be presented. After a factual introduction to the topic of genetics all students (52 biology

students, 50 humanity students) filled in domain-general and domain-specific epistemological beliefs inventories. Subsequently they obtained a list with six tasks of different complexity according to Bloom's revised taxonomy (Anderson et al., 2002). For each of the randomly presented tasks they completed a series of questions about their interpretation of the tasks, their goal setting and their planning of learning strategies. Results show that students discriminate between tasks and are reasonably well calibrated, e.g. their differentiations are related to task complexity in a meaningful way. Furthermore, these metacognitive processes of discrimination and calibration are impacted by epistemological beliefs. For example, students who believed in variable and changing knowledge judged the use of deep processing learning strategies and multiple information-sources more important across all tasks.

Epistemic beliefs in context: evaluating knowledge in learning online through web searches
Lucia Mason, University of Padova, *Italy*
Angela Boldrin, University of Padova, *Italy*

This study focuses on a currently relevant issue: accessing, judging, and interpreting information on the Web. It was aimed at investigating epistemic metacognition in context, that is, students' spontaneous monitoring and judgment of information when learning by surfing the Net, in relation to their individual characteristics. Students need to adopt a critical stance in order to be able to validate online information, distinguish between facts and opinions, supported and unsupported knowledge assertions, recognize bias or commercial propaganda. For instance, in order to deal with a large amount of information without being overwhelmed, they must ask themselves: "Is this piece of information credible?"; "What is the evidence that supports it?"; "Is this consistent with my own experience or knowledge?", "Do I know enough now or do I need more information?". Answers to these questions involve activating one's epistemic beliefs (Hofer, 2004). We examined whether 80 students in grade 12/13 spontaneously activate epistemic metacognition while surfing the Web to know more on a topic and the role of four factors that may contribute to it, that is, prior knowledge, expertise in online information searching, general beliefs about the Internet and argumentative reasoning skills. We also examined whether learning new knowledge was affected by overall epistemic metacognition. Findings revealed that students spontaneously expressed most reflections about the epistemic dimension: sources of knowledge. They also activated their beliefs about the simplicity/complexity of knowledge, although less frequently. As hypothesized, both argumentation skills and beliefs about Internet predict epistemic metacognition. In addition, expertise in online information searching influenced only the Internet surfing process. Finally, participants who expressed a more sophisticated level of epistemic metacognition learned more and integrated knowledge more than students who did not critically evaluate information sources and activate non-supportive beliefs about knowledge during the search for knowledge. Theoretical and educational implications are drawn.

The interaction of personal epistemology and the level of expertise in academic knowledge acquisition: The case of history
Margarita Limon, University of Madrid, *Spain*
Francisco Leal, University of Tarapaca, *Chile*

This paper will be structured in two different parts. The first one will include a concise review of both the theoretical frameworks and the empirical studies that have dealt with the interaction among individuals' level of expertise, their epistemological understanding and the learning process. I will suggest that individuals' epistemology of the domain may be an additional element to characterize the process of gaining domain specific knowledge. The second part will present

some data of a broader study conducted in the domain of history that explored the relationships among: a) individuals' level of expertise, b) individuals' level of epistemological understanding, c) individuals' understanding of the epistemology of the domain, and d) learners' beliefs about learning and teaching in that particular domain. The sample included three groups: freshmen, senior students and secondary school teachers of history (N=150). The main conclusions of this study are: a) individuals' level of expertise seems to influence how they understand the epistemology of history, b) a higher level of epistemological understanding correlates negatively with some views of history (e.g. history considered as a chronicle, history considered as a narration), c) a higher level of epistemological understanding correlates negatively with a traditional view of learning and teaching history, d) individuals' level of expertise and their epistemology of history influences some of their beliefs about learning and teaching history. Educational implications to explain the role of expertise and personal epistemology in learning history will be developed.

Children's perspectives on questionnaires of learning strategies and epistemological beliefs: Results of an interview study with elementary school children
Barbara Moschner, University of Oldenburg, *Germany*
Andrea Anschütz, University of Oldenburg, *Germany*
Stephan Wernke, University of Oldenburg, *Germany*
Uta Wagener, University of Oldenburg, *Germany*

Research about epistemological beliefs and learning strategies is a steadily growing area in educational psychology and in the field of education. Subjects in most of the published studies are adults or teenagers, only a few studies deal with children or even elementary school children. Some experts doubt if children have epistemological beliefs, others question if they have the competence to talk about abstract concepts like beliefs about knowledge and knowing or learning strategies. In addition measurement issues are far from being resolved. In our interview study we look at the understanding of questionnaire items concerning epistemological beliefs and learning strategies. Do elementary school children get the meaning of standardized items used in well-known questionnaires? One important result of our study is that children are able to verbalize their thoughts about epistemological beliefs and learning strategies. Merits and shortcomings of measurements are discussed in the light of our findings. We address developmental prerequisites and methodological problems concerning research in this age group. Finally we discuss the relevance of different measurements for future research with young children.

A comparison of four different measures of epistemological beliefs
Gregory Schraw, University of Nevada, Las Vegas, *USA*
Lori Olafson, University of Nevada, Las Vegas, *USA*
Michelle VanderVeldt, California State University at Fullerton, *USA*

The purpose of this research was to compare four different measures of epistemological beliefs. Eighty students (20 graduate, 60 undergraduate) completed the measures, which included two multi-item surveys (the EBI and CAEB), one holistic self-report based on short vignettes, and one graphical display measure (4-quadrant scale). Data was collected in autumn, 2006 and will be collected in spring, 2007. We will compare correlations among the four factor scores from the EBI, two factor scores from the CAEB, three scores from the vignettes, and two scores from the 4-quadrant scale in order to establish convergent validity among the measures. We predict a high correlation (i.e., .50 to .70) among across measures. Students who report absolutist scores (i.e., a belief in simple, unchanging knowledge) on one measure should report absolutist scores on the

other measures. Students who report relativist scores on one measure should report relativist scores (i.e., a belief in complex, changing knowledge) on the other measures.

C 19
29 August 2007 08:30 - 10:30
Room: 0.58 Ruff
Symposium

Videopapers as an innovative tool in the context of teacher education and research dissemination

Chair: **Federica Olivero,** University of Bristol, *United Kingdom*
Organiser: **Sally Barnes,** University of Bristol, *United Kingdom*
Organiser: **Daniel Cogan-Drew,** Tufts University, *USA*
Organiser: **Rune Krumsvik,** University of Bergen, *Norway*
Organiser: **Elisabeth Lazarus,** University of Bristol, *United Kingdom*
Organiser: **Federica Olivero,** University of Bristol, *United Kingdom*
Organiser: **Kari Smith,** University of Bergen, *Norway*
Organiser: **Rosamund Sutherland,** University of Bristol, *United Kingdom*
Discussant: **Salvador Llinares,** University of Alicante, *Spain*

Developed as part of the Bridging Research and Practice project at TERC (Boston, MA) to create an alternative genre for the production, use, and dissemination of educational research, Videopapers are multimedia documents that integrate and synchronize video, images and text in one non linear cohesive document. They can easily be created via the free software Video Paper Builder 3 (http://vpb.concord.org). This symposium aims to explore the use of Videopapers as an innovative tool in two different contexts, which share a focus on bringing together research and practice. These are: teacher education and professional development, and dissemination of educational research findings and practices. The symposium presents four different experiences that range from an initial exploration of the potentialities of videopapers to a widely established integration of this tool across teacher education programmes. In the four contexts, Videopapers are used as tools to foster student teachers' self-reflection, to enable teachers and student teacher to access research and relate it to their practice, to represent collaborative research processes involving researchers and practitioners. After discussing the specific features of videopapers highlighted by each project, the symposium will also contrast and compare how the different teacher education culture, cultural context and studied subject area influence the way videopapers are used, created and read. We believe that, due to their intrinsic characteristics, Videopapers offer opportunities for integrating educational theory and academic research with the excitement of classroom practice and, thereby, transforming teacher education, professional development and research practices.

VideoPaper Builder: A case of video-based technology in teacher education
Daniel Cogan-Drew, Tufts University, *USA*

The research presented here profiles the pioneering use of a new video-based technology, known as a VideoPaper, by a small graduate-level teacher education program to promote preservice teacher (PST) self-reflection. The aim of the research was to profile the effectiveness of the

VideoPaper technology in supporting self-reflection and to describe instances of its use that might represent some of the unique affordances of this new medium. The researcher interviewed students and faculty and reviewed the student writing in the VideoPapers. The researcher concluded that in the context of this particular program, which unilaterally adopted and supported the integration of the VideoPaper, the technology succeeded in supporting a more cohesive and coherent process and product that aided in the development of teacher self-reflection. These findings indicate that this new technology enabled the program to increase the self-reflection of its graduates, which in turn may contribute to a greater likelihood that these teachers will remain in the profession. The researcher will also present preliminary findings from new research to be conducted in spring 2007 on the use of VideoPaper to develop classroom reflection in two new populations: 1) preservice teachers in a small independent school; and 2) engineering students observing K-8 classrooms.

Using video papers for professional learning and assessment in initial teacher education
Federica Olivero, University of Bristol, *United Kingdom*
Elisabeth Lazarus, University of Bristol, *United Kingdom*

This talk draws on a research project (carried out at the University of Bristol, UK) aimed at investigating the use of videopapers as a tool for professional learning and assessment in initial teacher education. In particular we piloted the use of videopapers as a reflective learning tool for student teachers and its advantages/disadvantages over more conventional use of videos, observation tasks and assignments. The project involved two groups of Modern Foreign Language student teachers. In the context of their teacher training course, they were asked to create a videopaper instead of a written essay for one of their units that required them reflecting on two issues related to their practice. Videopapers enabled the developing teachers to select sequences and 'moments' in the classroom (video clips), link these to children's work (slides), a personal analysis (text), underpinned by research (text), all in one place and in one 'environment', thereby creating a potentially very powerful digital element of their professional development portfolio, in contrast to the more conventional ways of collecting and putting together evidence. One of the main issues emerged from the analysis of the data collected is the relationship between text and video both in the creation and in the reading of a videopaper. The videopaper is not dominated by the video but the text is an important component to it, which makes it a new mode for reflecting on and representing practice. Moreover, the ability to link raw data and video with text analysis and observations in a videopaper enables the 'reader' to interact with the content in a way that is significantly different from reading a traditional linear text. The students expected the reader (or themselves as readers) to interact with the videopaper and think about the evidence provided in the clips.

Video-papers: an attempt to closing the notorious gap in teacher education
Kari Smith, University of Bergen, *Norway*
Rune Krumsvik, University of Bergen, *Norway*

This talk draws on a research project (carried out at the University of Bristol, UK) aimed at investigating the use of videopapers as a tool for professional learning and assessment in initial teacher education. In particular we piloted the use of videopapers as a reflective learning tool for student teachers and its advantages/disadvantages over more conventional use of videos, observation tasks and assignments. The project involved two groups of Modern Foreign Language student teachers. In the context of their teacher training course, they were asked to create a videopaper instead of a written essay for one of their units that required them reflecting on two issues related to their practice. Videopapers enabled the developing teachers to select sequences

and ‘moments’ in the classroom (video clips), link these to children’s work (slides), a personal analysis (text), underpinned by research (text), all in one place and in one ‘environment’, thereby creating a potentially very powerful digital element of their professional development portfolio, in contrast to the more conventional ways of collecting and putting together evidence. One of the main issues emerged from the analysis of the data collected is the relationship between text and video both in the creation and in the reading of a videopaper. The videopaper is not dominated by the video but the text is an important component to it, which makes it a new mode for reflecting on and representing practice. Moreover, the ability to link raw data and video with text analysis and observations in a videopaper enables the ‘reader’ to interact with the content in a way that is significantly different from reading a traditional linear text. The students expected the reader (or themselves as readers) to interact with the videopaper and think about the evidence provided in the clips.

Using VideoPapers for multi-purposes: Disseminating research practice and research results
Sally Barnes, University of Bristol, *United Kingdom*
Rosamund Sutherland, University of Bristol, *United Kingdom*

In this paper we present a videopaper which represents a collaborative way of carrying out research between teachers and educational researchers. The overall aim of this research was to explore the complexity of teaching and learning in schools. Research in classrooms and educational practices is most often carried out by educational researchers on teachers and pupils. Rarely do the results find their way back into schools and classrooms. Therefore, the impact of much classroom-based research on educational practices has been limited. One aspect of this work is an emerging methodology for teachers and educational researchers to collaborate in an integrative process of carrying out research which allows for the different perspectives of teachers and educational researchers to promote discussion and reflection on the collection, analysis and interpretations of the digital video data. We have been experimenting with ways of representing this research process/practice that capture the essence of the collaboration. Using videopaper allows for the multi-purpose exposition of the different perspectives which emerge through collaborative research practices.

C 20
29 August 2007 08:30 - 10:30
Room: 0.99
Symposium

Visualization and Science Learning

Chair: **Richard Duschl,** Rutgers University, *USA*
Organiser: **Marcia Linn,** University of California, Berkeley, *USA*
Discussant: **Kenneth Koedinger,** Carnegie Mellon University, *USA*

When asked, almost everyone reports that they are a visual learner. How do we take advantage of this belief? The field is contested. Many make broad claims for the value of models and visualizations. Others argue that multiple representations make topics like chemistry difficult to learn. Some claim that visualizations are no more effective than static diagrams. This symposium reports evidence for successful uses of visualizations in four diverse contexts Jim Slotta,

University of Toronto, Canada describes college courses in nanoscience. Bat-Sheva Eylon, Weizmann Institute, Israel discusses university courses in design. Marcia C. Linn, UC Berkeley, and Hee Sun Lee, Tufts, United States discuss precollege science courses. Jan van der Meij and Ton de Jong, Twente, Netherlands, discuss precollege physics instruction. The presentations help explain the debate in the field by showing that visualizations often need iterative design to become effective–typically researchers test and refine the visualization in several cycles before showing the benefit– and that some visualizations succeed only when accompanied by other instructional activities. Simply "showing" how things work or presenting an expert visualization is not sufficient to improve learning. The presentations demonstrate that successful visualizations have a clear role in instruction such as bridging everyday and atomic models of scientific phenomena or enabling learners to test their conjectures and get feedback. In addition, visualizations succeed when embedded in inquiry activities that include eliciting student ideas, developing criteria, and supporting student reflection. The symposium will be introduced by Rich Duschl, Rutger's University, the lead editor of the recent National Academy of Science book entitled Taking Science to School. Duschl will set the stage by summarizing the role of visualizations in science education. Ken Koedinger, Carnegie Mellon University, will discuss the presentations, drawing on his groundbreaking research on the Cognitive Tutor and thoughtful approach to experimental design.

Implementing a framework for conceptual change in engineering science
James Slotta, Ontario Institute for Studies in Education, *Canada*

This paper builds on work by Chi and Slotta to address issues of conceptual change in engineering science for topics such as those encountered in nano science (e.g., microfluidics). In partnership with engineering educators, Slotta is developing a new technology enhanced system that helps engineering students build an ontological understanding of topics in engineering science. The system supports a special kind of training to establish an "ontological schema" for a category of concepts. All instructional materials are constructed on a technology platform called the Scalable Architecture for Interactive Learning (SAIL), and employ rich simulations and visualizations within a highly interactive java-based learning environment. The platform is open source, and was co-developed by the Technology-Enhanced Learning in Science (TELS) center. The author will present details of the study design, the materials and technology environment, and results of trials with engineering students. Through the application of basic cognitive research to new topic domains and ecologically valid settings, this study illustrates the powerful synergies that can occur between cognitive psychology and educational research.

Sequencing Multiple Dynamic Representations: Supporting students' learning with multiple representations in a dynamic simulation-based learning environment
Jan van der Meij, University of Twente, *Netherlands*
Ton de Jong, University of Twente, *Netherlands*

In this study we examined the effect of sequencing multiple dynamic representations, combined with explicit instruction to relate and translate between representations, on learning outcomes. Two versions of the same simulation-based inquiry learning environment on the physics topic of moments were compared: A learning environment providing the representations step-by-step, where the instructional support focused on relations between the variables in the domain as well as relations between the representations (experimental condition) and A learning environment providing all representations at once, where the instructional support focused solely on relations between the variables in the domain (control condition). The subjects were 106 students from

secondary vocational education and 125 grade nine students. Preliminary results show significantly better learning gains in the experimental condition. Further analysis of students' relational and translational processes and their connection with learning outcomes will be presented at the conference.

The effects of visualization on generating alternative solutions that support design projects
Bat-Sheva Eylon, The Weizmann Institute of Science, *Israel*
Shay Soffer, The Weizmann Institute of Science, *Israel*

The study was carried out in the context of a collaborative project between academy and industry ("Physics and Industry"). Sixty seven 11th-12th grade physics students worked in teams during 1-1.5 year on an authentic design project culminating in a working prototype. For example, one group designed a system for checking the road accident history of a motor vehicle. The program used the approach of "systematic inventive thinking" starting with design of many alternative imaginary solutions and then converging through an iterative process on the final product. We investigated the effect of using a thinking tool enabling students to visualize microscopic phenomena in an imaginary fashion ("amazing dwarfs") on the design of the projects. Analysis of 30 portfolios showed that the visual thinking tool enabled students to come up with many alternative solutions (about 80% presented a total of 6-20 solutions. These solutions were found useful in constructing the final physical projects. Also, the results highlight the importance of guiding students in the process of designing imaginary solutions, in characterizing the desired solutions, and in identifying similarities and differences between solutions beyond their visual appearance. Peer and expert reviews of intermediate products (e.g. the imaginary alternative solutions) were very effective in advancing the problem-solving process.

Visualizing Science
Marcia Linn, University of California, Berkeley, *USA*
Hee-Sun Lee, Tufts University, *USA*

Although visualizations in precollege science courses have often failed, the Technology-Enhanced Learning in Science (TELS) research program reports stunning impacts of visualizations embedded in inquiry projects on student learning. This presentation will analyze when visualizations succeed and identify factors that interfere with their success. Students grapple with multiple, conflicting, and often confusing ideas while learning science. Research has shown that instruction is both effective and durable when teachers use students' ideas as a starting point and guide the learners as they articulate their repertoire of ideas, add new ideas including visualizations, sort out these ideas in a variety of contexts, make connections among ideas at multiple levels of analysis, develop ever more nuanced criteria for evaluating ideas, and regularly reformulate increasingly interconnected views about the phenomena. We refer to this process as knowledge integration. TELS research teams have designed 18 modules that include embedded visualizations to promote knowledge integration. We found that successful modules introduced the visualization in the context of a personally relevant problem such as global warming, airbag safety, or recycling of materials. In addition, visualizations were most successful when they were introduced using a pattern that involved eliciting student ideas, enabling learners to interact with the visualization to test their conjectures, stimulating students to engage in a collaborative discussion to develop class criteria about valid scientific evidence, and encouraging students to reflect on the evidence and to sort out their ideas. In a cohort comparison study, over 50 teachers in 16 schools and 5 states showed that for life science, physical science, earth science, chemistry, physics, and biology, experience with TELS resulted in improved understanding of the science

topic over the baseline results for the cohort that did not study TELS. Overall gains on explanation assessment items were about one-third of a standard deviation.

C 21
29 August 2007 08:30 - 10:30
Room: 0.81 Ortvay
Symposium

Interest and development in practice

Chair: **Richard Walker,** University of Sydney, *Australia*
Organiser: **K. Ann Renninger,** Swarthmore College, *USA*
Discussant: **Marja Vauras,** University of Turku, *Finland*

Understanding interest and its development in relation to classroom practice and young people's lives beyond school makes an important contribution to developing learners' potentials. This symposium comprises four papers that seek to develop discussion about how we theorise interest by drawing on our investigations conducted in various practice-based settings. Each of the studies has been conducted in a different learning context, with participants including beginning teachers, young adults with Asperger's Syndrome, and secondary and elementary students. The papers also differ in terms of our theoretical perspectives and methodological approaches. In each paper, however, we frame our research in relation to the Four Phase Model of Interest Development recently proposed by Hidi and Renninger (2006) and we discuss our studies in response to three guiding questions. Firstly, we consider how practice-oriented research contributes to conceptualisations of interest and its development. Secondly, we examine the types of research questions, designs and methods that are suited to practice-based interest research. Finally, we explore the implications for practice arising from our research that may develop students', teachers' and researchers' potentials for learning. Reference: Hidi, S., & Renninger, K.A. (2006). The four-phase model of interest development. Educational Psychologist, 41(2), 111-127.

Investigating interest development in practice: Insights into how we conceptualise situational and individual interest
Kimberley Pressick-Kilborn, University of Technology, Sydney, *Australia*
Richard Walker, University of Sydney, *Australia*

Previous interest research and theorising has distinguished between situational and individual interest to explain changes in the source, nature and intensity of interest over time. Most recently, Hidi and Renninger (2006) have advanced explanations for how interest develops through four phases that are based on this situational and individual interest distinction. Our paper elaborates on the relationship between the situational and individual through conceptualising interest from a sociocultural perspective. Such a sociocultural approach provides a number of theoretical notions that can be applied to expand explanations of processes of interest development. Our paper draws on these theoretical notions to analyse and discuss qualitative data collected in a classroom-based longitudinal study. Twenty six grade 5 students participated in science lessons that were designed based on classroom learning community principles. Observational, interview and self-report data were gathered in relation to whole class and small group activities, as well as more specifically in relation to the individual participation of six focus students. Data gathered across multiple contexts

and time points enables interest development to be considered on community, interpersonal and intrapersonal planes, which provides an 'inclusively separate' approach to viewing situational and individual interest. Implications for classroom practice are drawn in relation to how the design of teaching and learning activities affords and constrains the potential for students' interest development.

Student perceptions of science, interest and self-efficacy: A short-longitudinal, cross-sectional study
K. Ann Renninger, Swarthmore College, *USA*
Christine N. Costello, Swarthmore College, *USA*
Sabrina J. Stevens, Swarthmore College, *USA*
Whitney S. Nekoba, Swarthmore College, *USA*

Session questions will be addressed using findings from a mixed-method short-longitudinal and cross-sectional study undertaken with students in fifth, eighth, and eleventh grade (N= 314, b= 137, g= 177) science classes across two years. Analyses conducted at the level of the individual and at the level of the classroom suggest the utility of comparing student perceptions to both their work with a think-aloud task and participant structures in the classroom. Active engagement with science, for example, appears to predict the development of interest. Similarly, students who work with the language of science are able to recognize and make connections to scientific thinking.

Interest and identity in the practice of beginning teachers
Susan B. Nolen, University of Washington, *USA*
Christopher J. Ward, University of Washington, *USA*
Ilana S. Horn, University of Washington, *USA*
Sara S. Campbell, University of Washington, *USA*
Karan Manha, University of Washington, *USA*

In this presentation we describe the relationship between interest and identity development in the multiple contexts of learning to teach. Beginning early in a graduate preservice program, we used ethnographic methods to capture changes in both teacher identity and interest in various teaching practices. Our first task was definitional: Can interest be distinguished from identity in teachers' speech and actions related to practice? Is interest appropriate to understanding motivation in professional programs? We used Hidi & Renninger's (2006; Lipstein & Renninger, 2006) developmental sequence to frame this inquiry, and looked for evidence of both situational and individual interest in teaching practices. Identity development was cast as occurring in social contexts through interaction, relationships, and mutual co-construction of norms in each context (Holland, Jr., Skinner, & Cain, 1998; Lave & Wenger, 1991). Next, we identified evidence of identity development and its processes, and evidence of interest in practices in multiple contexts. Teachers learn their profession in university classrooms, in school practica, and after certification, in their first teaching jobs. We collected observational data in all learning contexts and interviewed beginning teachers after or during each field observation. Based on three years of data, we will discuss how identity and interest develop in and between social contexts, and their relationship to each other, in three possible ways: 1. Current teacher identity opens (or closes off) the possibility to develop interest in contexts 2. Individual interests lead to selection of roles in contexts that in turn influence interest 3. Interests and identity co-develop in social contexts with particular features. Cross-case analysis of 8 focal students and their contexts will provide evidence for these possibilities, and for the reasonableness of treating identity and interest as separable.

Interest and Asperger's Syndrome: Theoretical and practical implications
Idit Katz, Ben-Gurion University, *Israel*
K. Ann Renninger, Swarthmore College, *USA*

Interest is a significant feature of the diagnosis and lives of learners with Asperger's Syndrome (AS). Unlike the interest of more normative populations that positively influences learning strategies, goal setting, and attention, the interest of people with AS is typically considered a liability and is something that is difficult for teachers and families to work with. In order to explore differences among learners with AS and those with more normative interest profiles, semi-structured e-mail interviews were conducted with 10 young adults with AS and 10 young adults not diagnosed with AS. Although interest appears to be a central aspect of life for both groups of participants, differences of structure and form in the interests of each group were identified. Theoretical and practical implications of these findings will be discussed.

C 22
29 August 2007 08:30 - 10:30
Room: 3.67 Békésy
Symposium

Fostering agency and knowledge creation: cases from higher education

Chair: **Anne Edwards,** University of Oxford, *United Kingdom*
Chair: **Marlene Scardamalia,** University of Toronto, *Canada*
Organiser: **Hanni Muukkonen,** University of Helsinki, *Finland*

This symposium presents cases from higher education where the development of agency and practices of knowledge creation are central. The symposium aims at understanding the role of individual and collective efforts of knowledge advancement around shared objects. The studies present different dimensions of agency from the theoretical perspectives of learning sciences and activity theory, and, further, reflect on these dimensions from the point of view of educational practices and empirical findings. The papers address forms of agency, particularly epistemic agency, and suggest empirical operationalizations of agency. The concept of boundary-crossing emphasizes traversing institutional, professional, and disciplinary boundaries; its implications for creating links between theory and applied work are addressed in the papers. Further, the competencies and metaskills for engaging in knowledge creation are examined. The symposium contributes to the discussion on domain-general skills and competencies relevant to students moving from educational settings to professional environments. In addition, it provides pedagogical examples for adopting assignments and course designs simulating professional problems and projects.

Assessing the development of epistemic agency of students in higher education: an explorative case study
Crina Damsa, Utrecht University, *Netherlands*
Jerry Andriessen, Utrecht University, *Netherlands*
Patrick Sins, Utrecht University, *Netherlands*
Gijsbert Erkens, Utrecht University, *Netherlands*
Paul Kirschner, Utrecht University, *Netherlands*

Epistemic agency is considered a type of human agency that learners need and develop in the context of learning processes (Hakkarainen, 2006) and it is concerned with the complex combination of qualities that permit a student to deal with knowledge and collaborative knowledge creation. Education should support students to become responsible for and to become actively engaged in their own learning and knowledge creation; in other words to become epistemic agents. This study attempts to identify features of epistemic agency development by students in higher education and to provide a framework to assess this development. An in-depth analysis study was conducted, using data gathered from higher education students who worked on collaborative tasks, in a project-based set-up. Based on theoretical insights, dimensions of epistemic agency were identified. A method of analytic generalization was used to compare the theoretical dimensions with identified changes in the empirical data and to decide whether these are indicative for epistemic agency development. A preliminary analysis indicated a number of dimensions of epistemic agency, wherein changes indicating development were identified, such as (collective) responsibility for the shared knowledge object and the advancement of the group's knowledge, coordination of interdependent plans of actions, or (self) monitoring and reflecting activities.

Epistemic agency in two higher education courses in organizational behavior
Orna Shternlicht, Hebrew University of Jerusalem, *Israel*
Zvi Ben Ami, Hebrew University of Jerusalem, *Israel*
Sarah Schrire, Hebrew University of Jerusalem, *Israel*

Unlike many courses in higher education where course content is simply transmitted to the learners usually through frontal lectures, the pedagogical approach in the two higher education courses that form the basis for this paper emphasizes learner participation, collaborative knowledge building, and the development of epistemic agency. Epistemic agency is one of the central concepts of trialogical learning, a main focus of the KP-Lab (Knowledge Practices Laboratory) EU project, which provides the framework for this study. In the trialogical approach, learning is viewed as a process of knowledge creation which concentrates on mediated processes where common objects of activity are developed collaboratively (Paavola & Hakkarainen, 2005). Characteristic of epistemic agency is that the participants themselves assume responsibility for the advancement of their knowledge and inquiry. Rather than rely on the teacher's or tutor's cognitive authority, the participants take responsibility for their own thinking and problem solving. Through epistemic agency, the participants are authoring themselves as well as their knowledge objects (KP-Lab, 2006).Consequently, they relate their personal ideas with one another, monitor advancement of collective activities, and overcome challenges emerging in the process (Paavola & Hakkarainen, 2005). The objective of the research is to follow up on these processes and to explore how they develop.

Boundary-crossing in the training of speech therapists in psychology
Anne-Nelly Perret-Clermont, University of Neuchatel, *Switzerland*
Pascale Marro, University of Neuchatel, *Switzerland*
Alexandra Bugnon, University of Neuchatel, *Switzerland*

The case presented belongs to the EU funded Kp-Lab project and explores boundary-crossing in a professional course. It concerns a course in psychology of relationships offered to speech therapists during their professional and academic training in a 4-years course in the University. In our intervention, we will first examine the image of the profession transmitted by the curriculum at large and then try to understand the implicits about the links between "theory" and "applied work". We will then consider the internships during which the students are immersed in the daily life of their future profession. These young students most often experience then their first contact with difficult life situations. We will thus consider what kind of questions they formulate explicitly and draw some hypothesis about their initial implicit difficulties in boundary-crossing over the disciplines, and from the university to the field. These will guide the next steps of the intervention and the examination of the data collected about their growing understanding of the relationships involved in speech therapy. One of the difficulties of such a training is the students' inability to link their former readings with their present observations. Another one is their shyness in discussing relationships and emotions. Yet, it was found that role-playing, discussions, and group work can contribute to the development of such skills. Another result concerns the types of expertise available in the profession. It seems that students behave as if they had been offered plenty of very limited models of action as speech therapists. They have difficulties in gaining also a general understanding of their intervention in terms of an educational/therapeutical activity to be appreciated as a whole. The results will be discussed in the perspective of activity theory, situated cognition, active and trialogical learning.

Promoting metaskills for collaborative object-oriented inquiry in a project management course
Hanni Muukkonen, University of Helsinki, *Finland*
Minna Lakkala, University of Helsinki, *Finland*

Metaskills of collaborative inquiry are proposed to address commitment to collective, object-oriented, and prolonged inquiry efforts, which are not reducible to individual productions. We suggest that these skills are triggered by practices where students are responsible for coordinating and directing their activities over different aspects of inquiry: own individual efforts, effective collaboration in group, and the "well-being" of the knowledge objects they are developing. To examine these hypotheses, we studied a multidisciplinary course on distributed project management. Forty-seven students took part in the course, organized into ten teams. The teams worked on authentic problems from a client organization, and they had to take, very concretely, the responsibility of advancing their work. Based on the team interviews half-way through the course, the student were rather confused and even distressed with the open-ended assignment and with managing team activities. At the end of the course, their self-reflections revealed a change to more positive evaluations of the value of such open-ended assignment. Findings of the study suggest that the metaskills of collaborative object-oriented inquiry need to deal with the strategies and efforts that are helpful in getting the inquiry going and improving the objects, despite difficulties and controversies.

C 23
29 August 2007 08:30 - 10:30
Room: 1.60
Symposium

Computer support for face-to-face collaborative problem solving

Chair: **Jerry Andriessen,** Utrecht University, *Netherlands*
Organiser: **Maria Beatrice Ligorio,** University of Bari, *Italy*
Organiser: **Jerry Andriessen,** Utrecht University, *Netherlands*
Discussant: **Richard Joiner,** University of Bath, *United Kingdom*

Computer mediated collaborative learning (CSCL) is already a solid stream of research. Many results and insight are gathered based on a quite conspicuous amount of researches performed. One of the reason CSCL covers such a large part of the educational research is because encompasses quite an array of settings involving computers; from users interacting in front of a screen, to users at a distance; from impact on cognition and metacognition to influence on the educational context intended as a large cultural environment. A particular situation yet not adequately inquired is how students (in their school practice) can be supported by technology when they face-to-face solve collaboratively open-ended problems. This symposium addresses this particular aspect. Thanks to a European Community funding, a project called LEAD is in progress in order to define the crucial aspects to obtain computer mediated face-to-face collaborative problem solving. As it can be easily assumed, many dimensions contribute to the definition of such specific setting. Each paper included into the symposium addresses a particular dimension. Maroni et al. inquiry about teachers expectations and representations. Gelmini et al. study teachers' activities related to problem solving and to use of computers in educational practices. Overdijk and Diggelen look at educational community's ways of appropriating the technology. Dyke et al. describe a tool able to perform parallel analysis of a multi-modal corpus. The ultimate goal of the LEAD project is to come up with educational and pedagogical directions to design a software aimed at supporting and improving face-to-face interaction when students (from primary to higher education) collaboratively solve problems. In fact, De Chiara's et al. papers discuss how the results gathered by the pedagogical partners can be implemented into such a software.

Analysing face to face computer-mediated interactions
George Dyke, Association pour la Recherche et le Developpement, *France*
Jan-Jack Girardot, Association pour la Recherche et le Developpement, *France*
Kristine Lund, University of Lion, *France*
Annie Corbel, Association pour la Recherche et le Developpement, *France*

Detailed analysis of face to face computer mediated interactions implies a study of a corpus composed of the interaction traces produced by the collaborative tool and video and audio recordings. Because of their separate nature, it is frequently difficult to perform this joint analysis. In order to facilitate such analyses we propose a model for describing corpora composed of sources from different media; we also describe how certain types of analyses can be modelled and reified for future use. We show how a tool based on these models facilitates a number of analysis methodologies by simplifying situations where entities are multiple: several researchers (inter-coder reliability), several sources for the corpus (multi-modal interactions) or several analyses (for re-use of prior analyses or for the confrontation and comparison of two different analyses. We

believe that capitalizing on previous analyses and affording parallel analysis of video and computer-mediated traces will open new avenues for researchers and teachers.

The conditions of classroom discussion: challenges for ICT re-mediation
Giulia Gelmini, University of Nottingham, *United Kingdom*
Charles Crook, University of Nottingham, *United Kingdom*
Shaaron Ainsworth, University of Nottingham, *Italy*
Claire O'Malley, University of Nottingham, *United Kingdom*

A growing body of research focuses on enhancing co-located group discussion through networked technology. To design effective technology, we need to understand existing classroom practices with unmediated debate. To this end, 13 classroom observations were conducted in a local college (students were aged 16-18). These served as a vehicle for exploring the generic features of classroom debate. Of these, we identified 6 as the most conspicuous for collaborative discourse. We argue that any technical re-mediation of such discussion needs to ground its agenda into the wide range of practices, values and expectations which these characteristics represent. The main characteristic of classroom discourse is teachers' scaffolding role: teachers' interventions dynamically adjust to each student's level of skills and expertise. Teachers scaffold classroom discourse by - encouraging the production of tangible outputs (Productivity) - interleaving present activities with preceding and subsequent ones so the product of a discourse feeds into the following discourse as a resource to draw upon (Continuity) - dynamically responding to the fluid nature classroom activities (Situatedness) - ensuring that everyone is given an opportunity to participate (Participation) through authentic, original contributions (Personalization) We argue that, if technology is to be embedded into educational practices in order to facilitate the teacher's job of scaffolding classroom discourse, the following objectives need to be at the top of designers' agenda: - furnishing the classroom discourse with a wide array of resources and structured representations for preparation, exchange, revision and integration of ideas - allowing the recording of this common knowledge into a tangible trace - accommodating for flexible lesson and agendas - facilitating teacher's floor control management and students' authentic contributions.

Tool appropriation in face-to-face collaborative learning
Maarten Overdijk, Research Centre Learning in Interaction, *Netherlands*
Wouter van Diggelen, Research Centre Learning in Interaction, *Netherlands*

It has been argued that group discussions in educational settings can be enhanced through a combination of face-to-face and computer-mediated communication. Computer tools provide the learners with structures that shape their actions, and give rise to specific interactions that have a positive effect on the discussion. However, the effect of a computer tool on a group of learners depends in part on how they appropriate the tool. We examine this process of tool appropriation to gain more insight in the way learners interact with educational technology.

Collaborative learning for teachers in Italian educational contexts: knowledge and practices
Barbara Maroni, University of Rome, *Italy*
Francesca Martini, University of Rome, *Italy*
Antonio Iannaccone, University of Salerno, *Italy*
Maria Annarumma, University of Salerno, *Italy*
Pina Marsico, University of Salerno, *Italy*

The present work investigates knowledge and expertise of a group of Italian teachers about the notion of collaborative learning (CL) from a pedagogical perspective inspired by the theoretical models of socio-constructivism. The study refers to three levels of analysis: "collaborative learning representation" (teachers conceptually relating to a Theoretical definition of CL); "pedagogical activity representation" (teachers accounting for collaboration in their classroom activities); "pedagogical activities in classroom" (collaborative activities into teachers actual professional practice). First and second levels of analysis are investigated through semi-structured interviews to 40 teachers working in primary and secondary classrooms located in Central and Southern Italy. Content Analysis on interviews has highlighted four main categories of CL representation (first level of analysis): "theoretical", "practical", "intuitive" and "undefined". At the second level of analysis, ("pedagogical activity representation") we frequently found that CL seems to be just a synonymous of "group work". Some teachers underline the importance of CL for problematic children because the group can be of a great help to them. Other teachers are not able to define CL at all. It seems that they don't have a theoretical knowledge, but it is possible that their practices are based on CL. Pedagogical activities in classroom (third level of analysis) will be explored through systematic observations in interviewed teachers classrooms. We will observe collaborative activities into teachers actual professional practice looking how CL would become an implicit aspect of practice.

Design issues for a co-located collaborative learning system
Ilaria Manno, University of Salerno, *Italy*
Rosario De Chiara, University of Salerno, *Italy*
Vittorio Scarano, University of Salerno, *Italy*

Most of the existing systems for collaborative learning are designed for remote situations, employing the traditional client-server model where the server coordinates the cooperation among remote users. Among the important features, remote systems is providing team awareness, workspace awareness, collaboration process awareness that have different scope in a co-located scenario. Users can "appropriate" these systems by using them in the face-to-face (f2f) situations, but a different design for addressing co-location is needed. The aim of this paper is to present the technological and design issues for a Co-located Collaborative Learning System (CoCoLeS). Our studies in this field are within the LEAD project, whose aims are to develop, implement and evaluate conceptual models, pratical scenarios and associated network-computing technologies for effective face-toface problem solving discussion (LEAD). On the basis of the inputs provided us by the pedagogical partners, we analyze the differences between remote and co-located systems and address the open questions specific to CoCoLeS design. The first and main difference between a remote and a CoCoLeS is the distance and remote systems employs a lot of effort, resources, design issues to fill up the distance between the users, a non-existing problem in f2f. Technologically, Local Area Networks dictate stringent requirements on management and ask for smooth service discovery and effective and stable connections. Functionalities that are influenced by the co-location are awareness, meta-task communication, teacher's role, control and design of

the phases while different tools, i.e., co-located tools can be fruitful i.e. tools where contributions are physically located by relating the screen of each learner to others' screens.

C 24
29 August 2007 08:30 - 10:30
Room: 0.100B
Symposium

Consequences of perspectives on the future for student's functioning

Chair: **Thea Peetsma,** Universiteit van Amsterdam, *Netherlands*
Organiser: **Thea Peetsma,** Universiteit van Amsterdam, *Netherlands*
Discussant: **Stuart Karabenick,** University of Michigan, *USA*

Students differ in their perspectives or orientations on the future and in the degree they keep in mind the consequences of their functioning now for their future. The concept of future time perspective is generally described as a conceptualization of a particular life domain in terms of time. It is characterized by 'extension' and 'valence', which means mainly the subjective extension more than the objective (see e.g. Gjesme, 1975; Lens, 1986). Nuttin & Lens (1985) defined future time perspective as the mental perception of future events, or the anticipation in the present of future events. This includes two aspects: a dynamic one, regarding the incentive value of an objective, or an individual's disposition to value goals in the future; and a cognitive one, that is the perception of the utility of a behaviour in the future. The cognitive aspect has been operationalized as perceived instrumentality, that is an individual's comprehension of the future value of a present behaviour. Future time perspective is mainly characterized as being cognitive in nature, but in other definitions the concept comprises affective components as well (Peetsma, 2000). Students' time perspectives proved to be good predictors of their learning behaviour, but other student behaviours, like their social functioning, seem to be influenced by the time orientation as well. In the four presentations different use of the time concept will be shown: instrumentality for the future and interest, future time perspectives, and a trait-like time orientation. These concepts have been subject of research with university students in Italy and the USA, students from the lowest type of secondary education in the Netherlands, students from a special class, and correctional institute in Norway. Both students' learning behaviour and social functioning proved to be related to time perspectives and orientation.

Psychology students' interest in subject-matters and perceived instrumentality: What relationship?
Pietro Boscolo, University of Padova, *Italy*
Laura Del Favero, University of Padova, *Italy*

The study to be presented is aimed at analyzing the relationship between interest in subject-matters and perceived instrumentality of Psychology students in two different moments of their curriculum. Recent studies in future time perspective have investigated the relationships of perceived instrumentality of school activities and disciplines, on the one hand, and various motivational variables, on the other, such as goal orientations, school investment, self-regulation, delay of gratification, and persistence in study. However, few studies have considered students' individual interest in a discipline among these variables. We posed two main research questions: How is interest in a subject-matter related to perceived instrumentality? What is the role of stored

knowledge and value component of interest in perceived instrumentality? Does this relation change across different moments of the Psychology curriculum? One hundred and forty Psychology students enrolled in the second/third year of the curriculum and one hundred forty-six enrolled in the fourth/fifth year, were asked to identify in their curriculum four subject-matters according to the 2x2 framework (High/Low Utility x High/Low Interest). For each of the selected subject-matters, they had to fill in a questionnaire with ratings and open-ended questions regarding, interest in each discipline, self-perception of competence, goal orientation, use of study skills and strategies, persistence and reaction to failure. It emerged that for older students interest in a subject-matter tended to enhancing perceived instrumentality, whereas low interest tended to decreasing it. In particular, whereas the cognitive aspects of interest (e.g., will to know more on the subject) seemed to have a weak relationship to perceived instrumentality, the value-related aspects (e.g., the importance of feeling competent, appreciation of the cultural and scientific relevance of the subject-matter) were more closely related to instrumentality.

Connecting with the future: Measuring future time perspective in science and engineering students
Jenefer Husman, Arizona State University, *USA*
Jonathan Hilpert, Arizona State University, *USA*
Christa Lynch, Arizona State University, *USA*
Wonsik Kim, Arizona State University, *USA*
Mary Anne Duggan, Arizona State University, *USA*
Wen-Ting Chung, Arizona State University, *USA*

Some of the most important steps students take toward an Engineering career are choosing the right coursework, experiences, and mentors to get them there. To help students choose career paths in Engineering, and persist in the face of inevitable difficulties and disappointments, we need to understand how they conceptualize their futures. The concepts and processes involved in this conceptualization make up a person's future time perspective (FTP). To facilitate research in science and engineering contexts, valid measures of FTP need to be established. The goal of the study presented here is to present evidence of predictive and convergent validity of a measure of FTP. Two hundred and eighty nine undergraduate students, one hundred of which are engineering majors, were surveyed. Preliminary analysis indicates that two measures of FTP, the FTPS and the Perceptions of Instrumentality Scale have moderate to strong reliability and construct validity. Additionally, both measures demonstrate the hypothesized relationships with strategy use and self-efficacy.

The developments in students' future time perspectives on different life domains, school investment and achievement
Thea Peetsma, Universiteit van Amsterdam, *Netherlands*
Ineke van der Veen, Universiteit van Amsterdam, *Netherlands*

Time perspectives can be seen as good predictors of students' learning behaviour and academic achievements. For the well-known decline in motivation and achievement from the start of secondary education, different explanations can be found. Besides a lack of 'person-environment fit', that is poor integration of young adolescents in the school environment, the developments in students' time perspectives might be of influence. Shifts in the relevance of life domains of students in secondary school have been found: time perspectives on school and professional career becoming less important while perspectives on domains of life, like leisure time and social relations, growing in importance or staying stable during the school period. For students from the lowest school level of secondary education motivation for school is often low. More understanding

of interrelations between the developments in these students' time perspectives, school investment and achievement, can be helpful preventing severe decline in their school investment. As a deficient investment has consequences for the school and professional career, this is quite important. The participants were 1517 students from all over the Netherlands: 735 in the first year and 782 in the second year of the lowest level of secondary school, 58% boys and 42% girls. A self-report questionnaire was administered four times during regular class time. The data were analysed using multivariate latent growth curve modelling with Mplus. The analyses showed that the development in long term future time perspective on leisure time is negatively related with the development in school investment and academic achievement while short and long term time perspectives on school and professional career are positively related with the development in school investment and achievement. Both short and long term perspectives on social relations were positively related with school investment but not with achievement.

Cognitive and affective insensitivity to future consequences: An investigation of determinants of antisocial attributes and aggressive behavior
Gunnar Bjørnebekk, University of Oslo, *Norway*
Torgrim Gjesme, University of Oslo, *Norway*

During the last thirty years the theoretical forefront of the research on development of antisocial behavior has been social learning theory. Few studies have focused on temperamental factors that underlie, determine, and maintain antisocial behavior. Some of them suggest that high approach reward-drive, weak fear-motivation, or punish®ment-insensitivity, constitute a critical mix of temperamental variables associated with aggressive and violent behavior to individuals with high impulsivity or low effortful or inhibitory-control (e.g. Rothbart et al. 2000). The research model for the present study combines the traditional dichotomous view of aggressive behavior (Berkowitz, 1993), Hare's two-factor model of psychopathic behavior, Gray's (1982) theory about the role of reward-sensitivity and punishment insensitivity in development of antisocial behavior with theories of cognitive and affective insensitivity to future consequences (Damasio, 1994; Gjesme, 1981).Cognitive and affective insensitivity to future consequences are related to individual differences in regulatory style and can explain variation in sustained pursuit of goals and flexible shifting of action from one goal to another in individuals with similar motivation. Future time orientation is therefore expected to predict attributes to antisocial behavior negatively. The study is based on 42 adolescences, 21 of them with a defined behavioral problem, and 21 ordinary ones from a matched group. The results suggest that attributes related to primary-psychopathy are rooted in temperamental low anxiety / low fear and low future time orientation, and predict both instrumental and emotional aggression. High level of dysregulation of negative affect is positively associated with emotional aggression via low future time orientation, attributes related to secondary-psychopathy and suspicion. Attributes related to psychopathic behavior mediating the relation between future time orientation and instrumental and emotional aggressive behavior. We can therefore conclude that future time orientation is an important determinant of antisocial attributes and aggressive behavior.

C 25
29 August 2007 08:30 - 10:30
Room: 1.58
Symposium

Home and preschool environments influencing young children's language, literacy and numeracy develop

Chair: **Paul Leseman,** Utrecht University, *Netherlands*
Organiser: **Paul Leseman,** Utrecht University, *Netherlands*
Discussant: **Hans-Günter Rossbach,** Otto-Friedrich-Universität Bamberg, *Netherlands*

National and international comparative studies consistently show that students from lower socio-economic and immigrant background obtain lower reading, writing and math scores than same-aged peers from other backgrounds. Particularly compelling is the finding that differences between students in school achievement at the end of primary school can be traced back directly to differences in cognitive, language, pre-literacy and pre-numeracy competencies at the time of primary school entrance. The topic of this symposium is how education and socialization at home combine with preparatory learning in preschool and kindergarten and, together, influence children's emerging school competencies. More in particular, the symposium addresses to what extent socioeconomic and cultural differences in informal education at home are moderated and compensated or, instead, amplified by the socioeconomic composition of the preschool, staff-child ratio, teachers' professional knowledge and teaching. The symposium brings together recent findings from Germany, the United Kingdom and the Netherlands, concerning large samples of children, including children from low-income immigrant communities. The German contribution illustrates the relationships between environmental quality during the preschool years and children's emerging cognitive and verbal competencies relevant for future school success. The British study shows how the learning environment of the home is more important than social class in shaping the literacy development of children when they enter school. However, the pre-school environment, particularly deliberate teaching related to literacy, has a powerful impact as well. Two contributions from The Netherlands detail the transition from home to kindergarten (part of the Dutch primary school) around the age of 4. The first paper focuses on Dutch as second language development in a sample of low income Dutch and immigrant children. The second paper, involving a different sample of 4-7-year-olds, analyzes the impact of kindergarten on the development of verbal and fluid intelligence.

Family and preschool: The influence of environmental quality on the development of school relevant competencies
Jutta von Maurice, Otto-Friedrich-Universität Bamberg, *Germany*
Katharina Kluczniok, Otto-Friedrich-Universität Bamberg, *Germany*
Minja Dubowy, Otto-Friedrich-Universität Bamberg, *Germany*
Susanne Ebert, Otto-Friedrich-Universität Bamberg, *Germany*
Susanne Kuger, Otto-Friedrich-Universität Bamberg, *Germany*
Hans-Günter Rossbach, Otto-Friedrich-Universität Bamberg, *Germany*
Sabine Weinert, Otto-Friedrich-Universität Bamberg, *Germany*

The presentation illustrates the relations between environmental quality during preschool years and the child's emerging cognitive and verbal abilities relevant for future school success. Using a

multi-method longitudinal study we especially try to disentangle the intertwining effects of family and preschool quality and competence development in 3 to 4 year olds. The research presented is part of a larger German research group studying educational processes, competence development and selection decisions in preschool and primary school age children (BiKS, Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vor- und Grundschulalter). In our presentation we bring together differentiated competence scores of 547 preschoolers and multiple quality measures of their families and preschool settings from two different measurement points (3 year olds and 1 year later). A special emphasis is put on the effects of migration background and parental education on environmental quality and competence development. Theoretical and practical consequences are discussed and an outlook on further analyses using the complete data set spanning children from age 3 to 8 in a longitudinal multi-level design is given.

The effects of pre-school and the home learning environment on children's pre-literacy skills at age 5: EPPE results
Kathy Sylva, University of Oxford, *United Kingdom*
Sofka Barreau, London Institute of Education, *United Kingdom*
Pam Sammons, University of Nottingham, *United Kingdom*
Edward Melhuish, Birbeck University of London, *United Kingdom*
Iram Siraj-Blatchford, London Institute of Education, *United Kingdom*
Brenda Taggart, London Institute of Education, *United Kingdom*

This paper explores the contribution of pre-school education and home learning on children's pre-literacy skills at school entry. Data were drawn from a large-scale longitudinal project (Effective Provision of Pre-school Education, EPPE) with a representative sample of 3000 UK children. Child assessments were administered at the beginning of pre-school (age 3+) and at entry to primary school (age 5) to allow value-added analyses. Multivariate analysis (multilevel modelling) showed independent positive effects of both preschool quality and the home learning environment on children's progress in vocabulary, phonological skills and letter recognition. Particularly strong predictors of children's learning were the literacy environment in preschool, parental reading to the child, teaching / playing with letters of the alphabet in the home, and taking the child to the library. Policy implications will be discussed.

Off to a good start? Differences in characteristics of early family and classroom experiences of low income and ethnic minority children in the Netherlands
Aziza Mayo, Utrecht University, *Netherlands*
Paul Leseman, Utrecht University, *Netherlands*
Anna Scheele, Utrecht University, *Netherlands*

The paper reports findings of two measurements, just before and just after kindergarten school entrance, that are part of a longitudinal study into informal preparation for school in Dutch and Turkish and Moroccan immigrant families in the Netherlands. Vocabulary development (first and second language) was less for non-native Dutch speakers, especially when from lower SES families. School enrolment did not contribute substantially to lessening this gap. The paper identifies and describes a number of family and school characteristics that seem to contribute to the persistence of this disadvantage. Less linguistically advanced children, start school having had fewer experiences with more cognitively complex and school-like language interactions in their family environment. Similar to a national trend, these children more often enrol in classes in which a large number of their classmates are second language learners, thus limiting their opportunities to experience high(er) quality Dutch language interactions with their peers. Furthermore, during

language interactions in these classrooms their teachers more often use teaching strategies (e.g. repetition, correction) aimed to primarily stimulate vocabulary development and basic language skills. In contrast, in classrooms with relatively few second language learners, teachers often use more cognitively demanding strategies during language interactions (e.g. open ended questions). These differences in early-in-life experiences with more cognitively complex language interactions, both at home and in school, seem to be of influence on children's vocabulary development and on the long run might play an important role in children's school success.

Preschool boosts verbal and fluid intelligence of disadvantaged immigrant children
Cathy van Tuijl, Utrecht University, *Netherlands*
Paul Leseman, Utrecht University, *Netherlands*

The current longitudinal study examined the effect of two and a half years preschool on the development of verbal and fluid intelligence of 4-6-year-old children of low-income ethnic minority families by determining the changes in full scale IQ, and in verbal-crystallized and fluid intelligence, relative to the age norm. The results showed that preschool boosted the intelligence of disadvantaged children, with medium effect sizes. Effects of preschool on gains in intelligence were moderated by children's home language and age. Using stepwise regression analysis, gains in verbal and fluid intelligence were found to predict emergent school vocabulary and pre-mathematical skill in addition to effects of pre-test intelligence. Children gaining most in intelligence also profited most with respect to emergent school skills. Moreover, gains in verbal intelligence predicted emergent vocabulary, but gains in fluid intelligence did not. Gains in fluid intelligence overall predicted emergent math, whereas gains in verbal intelligence predicted emergent math only with older children.

C 26
29 August 2007 08:30 - 10:30
Room: 1.71 Pócza
Symposium

Building dynamic mental models from visualizations (I)

Chair: **Wolfgang Schnotz,** University of Koblenz-Landau, *Germany*
Organiser: **Wolfgang Schnotz,** University of Koblenz-Landau, *Germany*
Organiser: **Richard K. Lowe,** Curtin University of Technology, *Australia*
Discussant: **Susan Goldman,** University of Chicago, *USA*

Instruction frequently aims at the learner's understanding of dynamic systems, which requires the individual to construct a dynamic mental model of the system and to perform mental simulations by 'running' the mental model in order to solve specific tasks. A frequent assumption hold by practitioners is that the temporal characteristics of an external visual representation should correspond to those of the represented content. This would imply that static pictures should be used to display static content because they lead to the construction of a static mental model, whereas animated pictures should be used to display dynamic content because they lead to the construction of a dynamic mental model. A more detailed consideration reveals however that this is not the case. Static pictures are not limited to supporting the construction of static mental models, but can also be the basis for constructing dynamic mental models and dynamic

visualisations are not limited to supporting the construction of dynamic mental models but can also lead to the construction of static mental models. This symposium will argue for a unified approach to dealing with visualizations with a special focus on constructing dynamic mental models from visualizations, regardless whether these visualizations are static or dynamic. It will analyze the nature of dynamic mental models in different domains using different methodological approaches, and it will focus on the question how dynamic perceptual schemata and prior knowledge about dynamic events can be used in the construction of dynamic mental models from external visual displays. Instead of the simple, but misleading research question, whether dynamic visualizations are more effective than static ones or not for the construction of dynamic mental models, the symposium will address the question, when (i.e. under which conditions) which kind of visualization will be more beneficial for the construction of dynamic mental models.

Temporal manipulations for instructional design: Effects of presentation speed
Sebastian Fischer, Knowledge Media Research Center, Tübingen, *Germany*
Stephan Schwan, Knowledge Media Research Center, Tübingen, *Germany*

Time-related design techniques of dynamic visualisations should provide various ways of adapting animations for specific instructional purposes. To put forward empirical investigations of these design techniques, altering presentation speed was chosen as a nowadays easy to achieve temporal manipulation, applicable to films and various dynamic visualisations. A complex mechanical system, a pendulum clock, was presented in a between subject design. To consider nañve concepts and to capture change of concepts, first prior knowledge on the working of a pendulum clock was recorded. Then the system was presented for 10 minutes as (a) static picture, (b) realistic-time or (c) time-lapse animation. During observation think aloud protocols and gaze movements were captured. No additional textual or auditory instructions were provided. Afterwards subjects were asked to provide a written explanation of how the clock functions. These were analysed regarding concepts on the main functional components of the clock, which are weight, pendulum and escapement. Comparison of both animation conditions replicated previous findings that higher presentation speed improves understanding, particularly concerning the role of the weight. Surprisingly the static condition was found to be as good as the time-lapse condition in reporting correct concepts: written explanations only differed slightly in their emphasis of the different parts. However when taking misconceptions into account, the time-lapse condition differs in tendency from both other conditions in reporting less false concepts on the pendulum. Gaze tracking data provide insights in effects of presentation speed on distribution of attention on the different parts of the clock. Here a general influence is found, albeit being not as tightly linked to reported concepts as expected. The role of bottom-up aspects like perceptual attributes of the dynamic visualisation, and top-down processing influenced by background knowledge about the mechanical system are discussed.

Animations and temporal manipulation: Supporting comprehension of complex dynamic information
Richard K. Lowe, Curtin University of Technology, *Australia*
Wolfgang Schnotz, University of Koblenz-Landau, *Germany*

This investigation explored the effect of playing speed on learner extraction of information from an animation depicting the operation of a complex dynamic device. The focus was upon what levels of information were available to learners at different speeds as a foundation for mental model construction. Teacher education students who were novices with respect to the depicted subject matter viewed sets of four successive presentations of normal speed and half-speed

versions of a non-idealised Newton's Cradle animation in six different conditions. The presentation sets in these conditions varied in terms of animation speed, set composition, and display order. Participants then completed physical simulation tasks to demonstrate the device's dynamics and make related predictions. Extraction of perceptually subtle but task-relevant micro level information was superior for multiple successive exposures to slow presentation speed versions whereas in conditions with a corresponding emphasis on normal speed presentation, extraction of information tended to be confined to the macro level. There was evidence that these patterns of extraction influenced the nature of the mental models used for subsequent predictions. The findings suggest that manipulation of an animation's temporal characteristics can be more beneficial to learning than a behaviourally realistic presentation of complex dynamic subject matter. Such manipulations appear to have potential for supporting learner extraction of low salience, high thematic relevance dynamic information that parallels the support provided by the visuospatial manipulations traditionally used to improve learner processing of static explanatory graphics.

Building dynamic mental models from animation: effect of user control on exploration behaviours
Mireille Betrancourt, Tecfa, University of Geneva, *Switzerland*
Cyril Rebetez, Tecfa, University of Geneva, *Switzerland*

Though animation seems particularly adequate to convey explanation of dynamic systems, the literature reports many cases in which animation did not facilitate learning. The current explanation is that novices failed to adequately process the graphic dynamic information and to build a mental model from it. It is assumed that giving control over the pace of the animation enables the progressive processing of multimedia information and facilitates the construction of the mental model. We carried out an experimental study in which learners were given either no control or high control on playing a series of animated sequences accompanied with text information. We found no significant effect on learning performance. However, we observed various behaviours in studying the multimedia material in both conditions. The results comforted the assumption that giving learners control over the pace of the animation can differently affect learning performance depending on their actual use of the control device.

Reasoning with interactive visualizations: The importance of individual differences among users
Madeleine Keehner, Curtin University of Technology, Perth, *Australia*
Mary Hegarty, University of California Santa Barbara, *USA*
Cheryl Cohen, Universitay of California Santa Barbara, *USA*
Peter Khooshabeh, University of California Santa Barbara, *USA*

In three experiments we examined interactivity and spatial ability in a task requiring participants to infer and draw cross sections through a virtual 3-D object with a complex internal structure. We manipulated whether participants could interactively control a computerized 3-D visualization of the object while performing the task. We also digitally recorded and analyzed patterns of interactive behavior among those who were given active control over the visualization. In Experiment 1, interactivity produced better performance than passive viewing of the object continuously rotating. However, this advantage disappeared in Experiment 2 when we equalized the visual information available in the two conditions using a yoked-pairs design. In Experiments 2 and 3, we observed large individual differences in how participants manipulated the visualization, and found that these were systematically related to performance on the task. In Experiment 3, non-interactive participants who watched pre-programmed optimal movements of the display (based on the best-performing interactive participants' manipulations) performed as

well as interactive participants who used the visualization effectively and better than interactive participants who used the visualization ineffectively. Spatial ability predicted performance in all experiments, but its contribution was independent of the effects of interactivity. The findings indicate that behavior in complex interactive tasks is determined both by the properties of external representations and by the properties of individual users. The results indicate the importance of individual differences for theories of distributed cognition and for the design and implementation of interactive tools in education and other domains.

Focusing prospective teachers' attention on relevant procedural knowledge: The effects of signaling and segmenting instructional videos and animations
Roxana Moreno, University of New Mexico, *USA*

Prospective teachers learned about teaching principles either with or without (control group) a video (Experiment 1) or a classroom animation (Experiment 2) illustrating how an expert teacher applied such principles to her classroom. It was hypothesized that directing attention to relevant dynamic information with signaling (group SI) and/or segmenting (group SE) the video/animation into smaller chunks of information would facilitate students' learning. Across both experiments, the control group outperformed SI and SE groups on a conceptual test but underperformed most video/animation groups on a high-order test in which students were asked to identify and evaluate teaching skills in a novel classroom video/animation. SE groups outperformed no-SE groups on conceptual, retention, and high-order tests. Measures of students' learning perceptions suggest that the benefits of the SE method reside on cognitive load reduction. The findings encourage segmenting instructional videos and animations into small chunks to help novice students learn from complex dynamic visualizations.

D1
29 August 2007 11:00 - 12:20
Room: PP1
Poster Session

Poster session

Chair: **Gyöngyvér Molnár,** University of Szeged, *Hungary*

Meta-Tutor: An online environment for knowledge construction and self regulated learning in clinical psychology teaching
Eduardo Penalosa-Castro, National Autonomous University of Mexico, *Mexico*
Sandra Castaneda-Figueiras, National Autonomous University of Mexico, *Mexico*

Many online courses of psychology reported in literature are web-based versions of traditional courses, based on a flawed model of how people learn, equating education to transmission of information. This model underlies the lecture-based classroom approach used in many university courses, as well as the online translations of these courses. In this study, an alternative is proposed and evaluated empirically: a learning environment based on a sound instructional design, including knowledge constructing and Self Regulated Learning features. Results show that learners using this environment perform better than controls in several tests. Implications for online learning environments construction are discussed.

Assessing insight? Some elements for a psychometric essay
Fatima Morais, University Minho, *Portugal*
Yvete Azevedo, University Minho, *Portugal*

One of the concepts more associated with creativity is insight and this concept has been progressively integrated in the Cognitive Approach and explored with a renewed interest from psychological research (e.g. Sternberg & Davidson, 1995). However, this recent and strong investment about explanation of insight has not been followed enough by empirical studies about its evaluation. Consequently, we felt the necessity of creating an assessment instrument that could give us some information about insight and its relationships with creativity. We conducted this study with university students. We selected 36 verbal situations identified as insight problems. After several studies using qualitative and statistical methods and after two applications to a global sample of 250 students, we selected 8 items. Each situation demanded the solver to restructure an initial, and more obvious, cognitive representation. The questions/answers format also try to control some questions that difficult research about insight. We did not only ask subjects to write the answers but we also wanted their explanation and we demanded subjects to refer if each answer was immediately thought after the problem is read; finally, we asked if the subjects already knew the situations. We found then reasonable values to show global and local fitting between results and the one-factor model proposed, as well a reasonable reliability coefficient and a normal distribution of results. This test also showed significant correlations with a reasoning test and with creative products. Finally, results significantly separated extreme groups of creative performance. These results can express a useful attempt in the domain of insight and we hope that future studies can reinforce its relevance in the context of creativity assessment.

Can differences in students' mathematical achievement be explained by differences in their computer use?
Martin Senkbeil, Leibniz Institute for Science Education, Kiel, *Germany*
Joerg Wittwer, Leibniz Institute for Science Education, Kiel, *Germany*

Recent research has provided evidence that students' computer use at home is positively associated with their performance at school. However, most of the previous studies have failed to take into account the multiple determination of school performance and to explain why using computers should benefit students' academic achievement. We present a study in which we attempt to circumvent the theoretical and methodological problems of previous research. We analyzed students' computer use and their performance in mathematics while accounting for other factors that have been found to affect students' achievement. In addition, we investigated possible differences in students' school performance depending on how they used the computer. Based on the data from German students who took part in the Programme for International Student Assessment (PISA) in 2003, our results showed that students' access to a computer was not related to their performance in mathematics. Also, there were no differences in mathematical performance depending on how often students used a computer at home. A positive effect on educational achievement was only observed for a small group of students who used the computer in a self-determined way that largely engaged them in problem-solving activities.

Cognitive, behavioral, and emotional aspects of emerging learning partnership
Beaumie Kim, National Institute of Education, *Singapore*

The motivation of this paper comes from an aspect of findings unexplored in previous research (i.e., Kim, 2004). Researchers have attempted to understand the relationships between individuals and technology (e.g., Suchman, 1987). Many studies on learning technologies, however, still struggle to move beyond the exclusive focus on individuals (Karasavvidis, 2002), as they often do not address how the tools extended the capabilities of the learners and how the tool use might entail different learning opportunities. The author's recent research attempted such understanding by studying characteristics, processes, and outcomes of learners with technology. It was to capture the complex interactions during learning with a 3D modeling tool in a college introductory astronomy laboratory through video-based qualitative method. Current research will re-examine the formerly processed data to further explore the emergent nature of learning partnership. The previous coding was based on meaningful chunks of actions that reconfigure the structure of distribution (Barab et al., 2001). The current coding will be focused on the incidents affected cognitive, behavioral, and/or emotional relationships among the members of the learning system. The beginning relationship will be fluctuated by each critical incident, and repeated incidents will have less effect. After a number of repetitions of incidental arrangements, the distances will be come closer and more stable. It is expected that the emotional, behavioral and cognitive relationship states will have mutual effects with each other. The factors that greatly affected the distance would be the main considerations for future design improvements (either modification or reinforcement).

Knowledge acquisition and opinion formation in science museums: The role of a discussion terminal for collaborative elaboration on controversial issues
Kristin Knipfer, University of Tübingen, *Germany*
Carmen Zahn, Knowledge Media Research Center, *Germany*

Today, science museums are often challenged by having to present highly controversial issues. Beyond presenting objects, facts and figures, the museums have to provide visitors with the opportunity to participate in public debates about those issues. In this paper we present a project that focuses on the potentials of discussion terminals for this purpose. A study was designed to investigate whether a discussion terminal for asynchronous communication among museum visitors can support deep elaboration of controversial information and formation of well-founded opinions in visitors. More specified, the salience of relevant arguments and active expression of one's own opinion are expected to result in deeper elaboration of content and higher degrees of learning. Additionally the study investigates the impact of other visitors' opinion on learning and opinion formation. Social comparison processes can stimulate elaboration of arguments and the development of visitor's own well-founded opinions. It is assumed that salience of arguments, active positioning, and social comparison are crucial factors for both learning and opinion formation. Elaboration of information should be deeper when arguments are salient and active positioning is possible. Social comparison should stimulate elaboration of arguments and evaluation of visitors' own opinion if a cognitive conflict between one's own opinion and others' opinion is elicited. Depending on salience of arguments and on individual variables our participants should use simple cognitive strategies like assimilation or real knowledge building activities on condition of inconsistent feedback about others' opinions. Attitudes that are based on more information are more stable in time. When people are actively engaged in judging a controversial topic, relevant knowledge should be better and more accessible than for people who only visited the exhibition passively as recipient of information.

Gate for collaboration: Stimulating collaborative knowledge construction with a 3D game environment in the context of distributed work
Johanna Bluemink, University of Oulu, *Finland*
Piritta Leinonen, University of Oulu, *Finland*
Sanna Järvelä, University of Oulu, *Finland*

The aim of this study is to examine how to support distributed teams in their collaborative knowledge construction. A virtual 3D multiplayer game "Gate for collaboration" will be used as a catalyst for the distributed teams in their shared activities. Currently there is an increasing need to create new solutions for distributed teams to ease the knowledge construction and multiplayer games could offer a rich medium for collaborators that engages players and creates a strong common context. This study builds on modern research on collaborative learning, which gives a strong theoretical understanding of how collaborators understand each other. An experimental study will be arranged in April 2007 with Executive Master of Business Administration students and several types of data will be collected, such as videodata and tracing asynchronous collaborative problem-solving before and after the game sessions.

Combining and comparing physical and virtual manipulatives in physics education
Zacharias Zacharia, University of Cyprus, *Cyprus*

The purpose of this study was to investigate the value of combining physical manipulatives with virtual manipulatives with respect to changes in students' conceptual understanding of electric-

circuits, and to compare the effect of virtual manipulatives and physical manipulatives on students' understanding of concepts of electric circuits that were introduced in the parts of the study's curriculum where physical manipulatives were substituted by virtual manipulatives. A pre-post comparison study design was used that involved 119 undergraduate students that attended an introductory course in physics. The participants were randomly assigned to two experimental and one control group. All groups used the same inquiry-based curriculum. Participants in the control group used physical manipulatives to conduct the study's experiments, whereas, participants in the experimental groups used both physical and virtual manipulatives, but in a different combination. Conceptual tests were administered to assess students' understanding before, during, and after the study. The data analysis involved both quantitative and qualitative procedures. Results indicated that the combinations of physical and virtual manipulatives enhanced students' conceptual understanding more than the use of physical manipulatives alone. Additionally, the use of virtual manipulatives alone enhanced students' conceptual understanding, in the parts of the study's curriculum where physical manipulatives were substituted by virtual manipulatives, more than the use of physical manipulatives alone.

Give them time to think it over: An effective computer-based learning environment for teachers
Tatjana S. Hilbert, University of Freiburg, Educational Psychology, *Germany*
Alexander Renkl, University of Freiburg, Educational Psychology, *Germany*

Learning from worked-out examples has been proved to be very effective in initial skill acquisition. In order to fully exploit the potential of example-based learning, teachers should know how to effectively employ such examples in classroom instruction. Therefore, we designed a computer-based learning environment in which mathematics and science teachers learn how to effectively use worked-out examples. The computer-based learning environment was deployed in a workshop on example-based classroom teaching. Participants (25 maths-teachers) first learned about example-based classroom instruction and afterwards received either the computer-based learning environment or the standard workshop materials (i.e., a printed version of the workshop-foils) for follow-up course-work. A comparison of the training with and without the computer-based learning environment showed that teachers who had the opportunity to deepen their knowledge with the computer-based learning environment had significantly more knowledge about this topic. Furthermore, teachers who were given the computer-based learning environment rated the intenseness of their follow-up course-work higher. However, they did not spend more time with follow-up course-work. Thus, the differences in learning success are supposed to be based in the more intensive follow-up course-work to which the participants were encouraged by the computer-based learning environment.

The qualities of human and tool mediators in net based learning
Raija Latva-Karjanmaa, University of Helsinki, *Finland*

The study analyses mediated learning in a net based learning environment and the research question is: how the students experience a net based learning course from the point of improving their study skills. Mediation in the learning process can be defined as an intervention method intended to improve the adaptability and flexibility of learners in new learning situations (Feuerstein) and a pre-requisite of human development and learning (Vygotsky). Mediated learning is analyzed through its agents, the human and tool mediators. The assumption in this study is that mediation of learning assists students by providing support and tools to help the students to improve self-awareness and learning skills when studying in technology-based environments. The phenomenon of mediated learning is discussed in a philosophical

phenomenological analysis. Criteria of mediation are developed for net based studies based on Feuerstein theory of mediated learning experience (MLE) and Vygotsky's theory of tool and socially based mediated activity. The researcher acts as a net tutor in a net course using a learning assistant (IQ FORM) to develop their learning skills in a polytechnic. IQ FORM is a net based learning tool developed for the Finnish virtual (www.virtualuniversity.fi). The data is analyzed by empirical phenomenological analysis of Moustakas. The interview results of 14 students indicate that there are elements of mediation in this kind of learning tool (IQ FORM). (1) The majority of the students became aware of their learning potential. (2) Many learned to think harder, when they study. (5) Many learner new learning skills. The IQ FORM tests, tutoring tool and the IQ FORM diary acted as tool based mediators in the learning process stimulating the students to self-reflection, critical thinking and analytical thinking.

A methodology for understanding cognitive, affective, and cultural aspects of learning in online discourse

Charoula Angeli, University of Cyprus, *Cyprus*
Neil Schwartz, California State University, Chico, *USA*
Scott Wallace, California State University, Chico, *USA*

In this paper, we first discuss a model showing the way representations within mind give rise to negotiated representations between minds, and how artifacts and their affordances elucidate where knowledge resides and how it is transformed and shared in Computer Supported Collaborative Learning (CSCL). The paper uses the model to offer guiding principles for characterizing the nature of distributed cognition in CSCL, and developing scoring methods to reveal it. Furthermore, we discuss in detail how the model was used in an investigation of problem-solving within an ill-structured, emotionally charged political problem affecting culturally-attached and unattached learners. The model, and the coding scheme that was developed provide a methodology for discourse analysis, which explains the role of individual mind in the dialogical process, and social interaction in terms of the cognitive, affective, and cultural elements that underlie it.

Research on the efficiency of the application of didactical tools when generating multimedia-based learning environments

Ludger Wedeking, RWTH Aachen, *Germany*

Learning with multimedia-based learning environments is becoming increasingly important in school since these types of environments are offering teachers new possibilities of conveying learning contents in their classes. Consequently, teachers are confronted with more and further developed programmes for multimedia-based learning environments, which can however only be compromise solutions, due to the multiple factors, depending on subject matter and group of learners that have to bear in mind. Ideally, teachers should generate their own multimedia-based learning environments adjusted to the specific subject matter and the particular group of learners, but teachers usually do not possess the required knowledge necessary to edit multimedia-based learning environments. Due to this problem, in this still ongoing study a didactical tool, based on the Cognitive Theory of Multimedia Learning by R.E. Mayer, has been developed. Depending on the nature of information that is to be conveyed, it makes recommendations which multimedia possibilities one could use in order to support the learning process through the presentation of the subject matters in the best possible way. The central question within the scope of reference of this investigation concerning the application of a didactical tool when generating multimedia-based learning environments is whether or not, the use of such a didactical tool has an influence on the quality of multimedia-based learning environments created by teachers. In order to answer this

question, the generated multimedia-based learning environments developed by the test persons are examined with regard to their quality in the scope of a quasi-experimental research. The treatment group receives assistance from the didactical tool when editing the learning environments, whereas the control group has to work without the didactical tool. In the poster-presentation, the theoretical approach of this study, the didactical tool, first results of the ongoing study and its practical and educational relevance will be presented and discussed.

D2

29 August 2007 11:00 - 12:20
Room: PP2
Poster Session

Poster session

Chair: **Krisztián Józsa,** University of Szeged, *Hungary*

"The modern danish student" – a questionnaire of students' attitudes to education, motives of choice of study and attitudes to teaching at a university.
Berit Lassesen, Department of Psychology, University of Århus, *Denmark*

A study based on diaries written by 82 students at Roskilde University (Simonsen & Ulriksen, 1998) concluded that the attitudes regarding choice of education and educational activities of the "modern Danish student" are characterized by 1) an orientation towards the individualized and personal aspects, 2) an internally motivated and existential "personal growth" orientation, 3) a process - rather than result-oriented attitude towards educational activities, 4) a short-term "here-and now" motivation, and 5) an ambivalent attitude towards who is responsible for the result of the learning activities - the teachers or student him- or her-self. This study attempts to test whether the conclusions concerning the "Modern Danish student" can be generalized to other student populations. Based on theoretical conclusions and statements cited by Simonsen and Ulriksen, a questionnaire was constructed. Factor analyses revealed a number of internally consistent and theoretically relevant dimensions. 686 students from four different faculties at the University of Århus then completed the questionnaire. The results confirmed that the attitudes of philosophy students corresponded to those described by Simonsen and Ulriksen (91% correspondence). Students from other faculties, however, differed in their attitudes from the ones reported by Simonsen and Ulriksen. For example, the attitudes of medical students only showed a 45% correspondence. Their attitudes were found to be more long-term career-oriented than short-term motivated, more pragmatically oriented than personal-growth motivated, and more motivated by external than internal factors. While the conclusions of Simonsen and Ulriksen perhaps can be generalized to students from humanistic faculties, they do not seem to be representative of students from other faculties.

The effect of emotional states on the formation of performance expectancies
Oliver Dickhäuser, University of Erlangen-Nürnberg, *Germany*
Marc-Andre Reinhard, University of Mannheim, *Germany*

It was predicted that emotional states affect the way, how individuals build their performance expectancies. Emotional states were assumed to affect the mean level of the performance

expectancies and to influence whether the expectancies relate to general or specific self-concepts. Positive mood should lead to more intensive information processing than negative mood. More specifically, individuals with positive mood should simply infer their performance expectancies concerning a specific task from their general self-concept (as a result of intensive information processing), whereas for participants in negative mood, performance expectancies should be inferred from the relevant specific self-concept (as a result of less intensive information processing). In an experiment, positive or negative mood was induced in N = 158 university students. General and specific self-concept as well as task specific performance expectancies and task performance were assessed. As predicted, mean expectancies were higher in the positive mood-condition than in the negative mood-condition. Furthermore, specific self-concept was predictive of expectancies when participants were in negative mood. When participants were in positive mood, expectancies could only be predicted on the basis of the general self-concept. The findings support the idea that the formation of performance expectancies can be understood as information processing. We discuss how emotional states affect learning processes.

The reading skill and reading strategy definition problem
Peter Afflerbach, University of Maryland, *USA*
David Pearson, University of california, *USA*
Scott Paris, University of Michigan, *USA*

The terms "reading skill" and "reading strategy" are central to how we conceptualize and teach reading. Across the history of reading research and reading instruction (Huey, 1908; Snow, 2002; van Dijk & Kintsch, 1978) skill and strategy are key terms. Despite their importance, the terms are not well defined nor are they used consistently. The lack of consensus in understanding and using these terms may diminish the impact of research and practice aimed at helping children become better readers. This presentation describes the problem of lack of clarification of the terms skill and strategy, examines the history of use of the terms in published reading curriculum, and analyzes the development and use of the terms in reading research. Definitions for reading skill and reading strategy that clarify both their differences and their relations are proposed.

A comparison of e-learning in Scotland's colleges and secondary schools: the case of National Qualifications in 'Core Skills'
Julia Davidson, University of Glasgow, *United Kingdom*

The National Qualifications (NQ) framework has been linked to online resources to support its development in Scotland's colleges and secondary schools. The framework involves the 'Core Skills' units: Numeracy, Communication (English Language), Information Technology (IT), Problem Solving, and Working With Others. This paper compares the utilisation of the web-based materials in secondary schools and colleges. The research included a national survey of college lecturers and teachers, and case studies of secondary schools and colleges. By far the most popular 'Core Skills' resources were for Numeracy. In the majority of surveyed colleges, respondents' attitudes to the resources were positive. The online materials were typically used in courses in conjunction with other teaching approaches. The materials provided helpful benchmarks for NQ assessments. The evidence suggested that less motivated learners benefited from the online resources when they were contextualised for some college courses. Among secondary teacher respondents, the resources were virtually unknown. The majority of secondary teachers reported that they needed more time to evaluate the 'Core Skills' resources. In conclusion, although the two sectors have overlapping student groups, in terms of developing and piloting suitable online resources each sector needs to be considered separately.

The role of individual's intelligence in the era of information overflow
Maria Ledzinska, Warsaw University, *Poland*

The rapid development of information technology (IT) can be seen in every aspect of today's life. The presence technology in everyday life has positive outcomes, such as increased living standards, efficiency of work and teaching. But at the same time, modern technology can bee a source of psychological problems. One of those problems concerns the difficulty in processing vast amounts of information and knowledge. Psychologists point to a phenomenon called information overflow, data overload etc. So many people exhibit in cognitive situations psychological discomfort, labelled information stress. This notion is used to describe the situation, when the individual is not able to process great amounts of information and different kinds of stimulation, and has by the same negative emotions towards own cognitive possibilities. The most important matter seems to be measuring the intensity of the experiences of this form of stress. The research tries to identify individual determinants of info-stress by examining, among others, cognitive and emotional intelligence. 120 young adults, aged 18-25, took part in the studies. All were university students. The strength of the experienced information stress was assessed by the questionnaire KSI (Information Stress Experiences Questionnaire) constructed by the author. It permits to measure the information stress experienced at the information input, during the mental processing of data, and at the information output. Cognitive intelligence was assessed by the Raven's Progressive Matrices – Advanced Version, emotional intelligence by the INTE Questionnaire (Polish version of Schutte et all. Questionnaire). The results obtained to date show that cognitive intelligence has no relation with experiencing information stress. But emotional intelligence, which minimizes the experience of info-stress in the phase of mental information elaboration, may play a crucial role in helping to overcome the info-stress.

«While I am reading I am thinking» - a cognitive strategy for literary text comprehension
Rosa Maria Amaral, University of Oporto, *Portugal*
Leonor Lencastre, University of Oporto, *Portugal*
Isabel Duarte, University of Oporto, *Portugal*

This study examined the effects of some cognitive strategies learnt by the students to foster poetic texts comprehension, and to relieve interpretation difficulties under a framework of reading as a responsive meaning construction and as a thinking activity. Since ninth grade curriculum demands elaborated poetic comprehension mastery, this approach aims to develop students' figurative competence. In an ecological setting two regular Portuguese classes participated with a total of 25 students each, being assigned twenty lessons (forty-five minutes each) to the learning period. With the experimental group a reading program was carried out favouring self-questioning on previous knowledge recalling of concepts used metaphorically, metaphorical knowledge mapping, interpretative hypothesis and rereading. These cognitive strategies choice was based on the data of a previous qualitative study identifying strategies used by skilled ninth grade readers through the analysis of verbal protocols produced under a self-reporting verbal task. For the control group the traditional method of teacher-student questioning and passive reading methodology were elected. The texts selected presented metaphorical content and a metaphorical structure and were written by Portuguese authors included in the national curriculum. Comprehension was assessed through the analysis of students' reports to six open-ended comprehension questions about the texts and the analysis resulted in a classification according to a scale of cognitive response to poetry. To test the effects of the intervention plan a pre and post-test design was employed. The data showed that the experimental group achieved better results in poetic comprehension than the control group.

The effects of learning strategies on learning outcome
Viola den Elzen-Rump, University of Duisburg-Essen, *Germany*
Detlev Leutner, University of Duisburg-Essen, *Germany*

Helping students to develop effective ways to deal with information is a major goal of educational systems. This study aims at clarifying if it is possible to implement cognitive and metacognitive learning strategies by permanent stimulation and instruction over a long period of time in regular courses. Participants (N = 1134) are provided into experimental versus control conditions. Study was conducted primarily to answer the following research question: Do using learning strategies in standard courses improve learning outcomes of reading comprehension? Results reveal that it is possible to integrate cognitive and metacognitive strategies into standard instructions and that it is beneficial on long-term comprehension for tenth graders.

Is it a tuna or a mackerel? Learning to categorize fishes
Katharina Scheiter, University of Tübingen, *Germany*
Gabriele Cierniak, Virtual PhD Program Tübingen, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*

A major challenge for students in Biology is to distinguish different species of a given class (e.g., fishes) and assign them to a category of similar exemplars (i.e., a family). In the current study we investigated whether biological classification can be supported by presenting either realistic or schematic pictorial representations of exemplars for each category. Realistic pictures (e.g., underwater photographs of fishes in their habitat) can be used to train students in coping with the complexity they might experience in authentic scenarios. However, they usually contain various irrelevant information that hinders the detection of category-defining features in the exemplars. It can therefore be argued that schematic pictorial representations of exemplars will facilitate their categorization compared to realistic pictures. In the experiment 24 pictures of different fishes were presented to students with little prior knowledge, whereby always three fishes belonged to the same family. As a first independent variable the level of realistic detail of the pictures was varied. As a second independent variable the availability of additional information concerning the category-defining features was manipulated. To test the quality of the categories acquired, learners were subsequently asked to name the fish family for 48 fishes that (a) they had already seen during learning, (b) they had never seen before but that belonged to the learned categories or (c) that did not belong to any of the categories (distractors). The results showed that there were no differences between the two pictorial representations with regard to their effectiveness for learning. However, while students learning with realistic pictures benefited from being given information on the relevant features, students with schematic pictures showed worse performance when being given this information. The latter finding may indicate that for students with schematic pictures this information was redundant and thus interfered with learning.

Cognitive development and the labour insertion of mental handicapped people
Teresa Becerra, University of Extremadura, *Spain*
Manuel Montanero, University of Extremadura, *Spain*
Manuel Lucero, University of Extremadura, *Spain*

In this work we aim to describe the evolution of two mental handicapped people in the realization of activities related with the administrative administration in the Public Administration. An initial evaluation was made to observe cognitive capacities that are necessary in the realization of those activities. Later, several sessions were carried out to develop the deteriorated cognitive capacities

in the people with mental handicapped. The materials used during the working sessions will facilitate no only the training of these capacities, but also the transmission of that training to social and labour environments. Finally, the participants of the investigation will develop cognitive tasks with a higher level of quality.

The development of critical reading abilities in children aged 9 to 14
Lucia Bigozzi, University of Florence - Department of Psychology, *Italy*
Claudio Vezzani, University of Florence - Department of Psychology, *Italy*

Reading process can be defined as "critical reading" when it arouses in the reader a truthfulness and dependability judgment about a particular topic. Critical reading can't be conceived without subject's thinking processes (Mellor & Patterson, 2001), and so it would be considered as natural extension of critical thinking (Hughes & Lavery, 2004). Many studies have reported the relevance of gender differences in reading tasks (Kush & Watkins, 1996; Wigfield & Guthrie, 1997). Moreover, the developmental aspects of critical thinking have been investigated very rarely in psychology (Kuhn, 1999). Aim of the present study is to investigate the development of critical reasoning in a reading task. Our first hypothesis is that critical-valuational competences are improved with increasing of the age in a non-linear progression. We also expect that there are differences between males and females, but that they are not constant at the various ages examined. Sample was consisted of 1079 pupils, 512 males and 567 females, aged from 9 to 14 years old. To measure the critical reading competences, all the participants were asked to perform a standardized test (5-VM, Boschi, Aprile & Scibetta, 1995). The relationship between critical reading abilities, age and gender was verified using Generalized Additive Models (Hastie & Tibshirani, 1990). The results have shown a non-linear increase of critical reading abilities (Chi-square(5) =11.14; p(6)=9.43), while gender did not show statistical significance (Z(1)=-1.23). The interaction between gender and age had a significative influence upon the criterion variable (Z(1)=2.10). Females under 10 years old seem to consider the meaning of the text as something to learn, and it could explain their low critical reasoning abilities. After the age of 13, the motivation and the interest for reading activities is deeper in females than in males.

Children's ability to listen and to learn from their peer's explanation of a mathematical solution
Miho Kawasaki, Kyoto University, *Japan*

This study examines elementary school children's ability to listen and to learn from other children's solutions of a mathematical problem. The participants were 284 fifth-graders. They were asked to solve one mathematical problem which they had not learned yet (pretest), after which they watched two types of VTRs in which other children explained their solutions to the problem (learning). Then the children were asked to recall and comment on the other children's solutions to the same question (questionnaire), and were asked to solve the problem again (posttest). In the first VTR, a child explained an unorthodox solution, and in the second VTR, another child explained an orthodox solution. We analyzed the relationship between what they recalled and how they evaluated the orthodox and unorthodox explanations of the solutions and their own solutions in the pretest and the posttest. The results show that children who understood the orthodox solution in the pretest or the posttest could remember the unorthodox solution and give negative comments on it. On the other hand, the other children could not remember the unorthodox solution given to them by the student via VTR and gave positive or irrelevant comments. These results imply that the ability to listen to peer's explanations might be important to learn in the classroom, though understanding other's solutions correctly seems to be very hard

for many elementary school children. Actually, children might not always pay attention to their peer's statements the way their teacher would like them to.

D3
29 August 2007 11:00 - 12:20
Room: PP3
Poster Session

Poster session

Chair: **Csaba Csíkos,** University of Szeged, *Hungary*

Assessing modeling skills, meta-cognitive modeling knowledge and meta-modeling knowledge
Christiana Th. Nicolaou, University of Cyprus, *Cyprus*
Constantinos P. Constantinou, University of Cyprus, *Cyprus*

Modelling is a fundamental ability in science. The present paper describes an attempt to develop and validate a series of open-ended diagnostic tests for measuring University students' modelling ability. We have designed tests for measuring three aspects of the modelling ability: a) specific modelling skills, b) knowledge about the modelling process, and c) meta-modelling knowledge. The twelve tests developed were used to assess the effectiveness of an inquiry oriented modelling-based curriculum that was implemented in the frame of a blended e-learning course at the University of Cyprus, during the spring semester of 2006. Our sample consisted of seventeen pre-service teachers who attended the course. We analytically describe the assessment procedure for one of the tests and summarize the results of the remaining tests. Combined qualitative (phenomenographic analysis) and quantitative analysis (Multivariate Analysis of Variance-repeated measures) indicates the quality of the tests and provides some insights on the effectiveness of the instructional intervention for the development of students' modelling ability and for the transfer of this ability in new unfamiliar contexts.

Understanding the variation in academic success of first year accounting students
Barbara Flood, Dublin City University, *Ireland*
Marann Byrne, Dublin City University, *Ireland*
Pauline Willis, Dublin City University, *Ireland*

As participation in higher education increases and greater diversity is reflected in the student body, universities face new challenges regarding student transition, progression, retention and ultimately, academic success. Prior literature identifies that students' academic achievements are influenced by a range of background variables and their approaches to learning, reflecting the complex web of interactions that occur during the learning process. This paper examines the relationships between students' preparedness for higher education, their motives, expectations, prior achievements, learning approaches and their academic success. Specifically, it compares the personal variables and learning approaches of students who excel academically, to those who are significantly less successful in their studies. The research focuses on first year accounting students at an Irish university. Cluster analysis was carried out to identify factors distinguishing high achieving students from low achieving students. The analysis reveals that the high achievers take a more strategic approach to their learning and have better prior academic results. Furthermore, they are less interested in the sports and social opportunities offered at university and are more likely to

read around the syllabus. The study enhances educators' understanding of academic success in a disciplinary context and outlines directions for future research.

Framework: Deriving, designing, and applying dynamic stories in information security
Stefanie A. Hillen, Agder University College, *Norway*
Jose J. Gonzalez, Agder University College, *Norway*

"If stories are powerful, then we need to understand why they are in order to benefit from their potential for knowledge transfer ..." (Swap et al. 2001, p.106). The use of stories to support learning is not new (McEwan & Egan 1995). Indeed, stories based on the experience of experts commonly used in instruction involving complex domains to reflect an expert's individual experience and to convey in a meaningful context recognized principles of best practices. However, such stories may not represent the relevant complexity of a particular system and they may not promote deep insight and improved performance with regard to problem solving in complex domains. The innovative approach reported herein makes use of stories that are generated from formal system models (SD), developed by the AMBASEC[1] project. To derive dynamic stories from computer-based models guarantees that they have both, authenticity and relevance to the behavior of the modeled system. In this paper, we distinguish different kinds and parts of dynamic stories and indicate how they can be used to support a variety of learning goals and situations. The development of a framework is needed to strengthen the concept of dynamic stories for the application in Information Security[2]. [1] AMBASEC = A Model Based Approach to Security Culture [2] Information Security = all aspects related to defining, achieving, and main®taining confidentiality, integrity, availability, non-repudiation, accountability, authenticity, and reliability of information or information processing facilities.

Approaches to learning as a complementary explanation of self-direction in learning
Dirk Bissbort, The institute: Centre for Educational Research, *Germany*
Katja van den Brink, Centre for Educational Research, *Germany*
Peter Nenniger, Centre for Educational Research, *Germany*

Findings from different areas of research about the conditions of self-directed learning are rather ambiguous. From a phenomenographic view this situation is not surprising. We may even assume that different modes of self-directed learning might contribute to specific learning processes and outcomes and that for a more adequate explanation we rather need a differential than a general approach to self-direction. In this poster results from current research are presented which are based on a merge of theoretical concepts related to "Approaches to Learning" and selected models of "Self-Directed or Self-Regulated Learning". For this purpose elements from the respective concepts (with special focus on cognition, motivation, and emotion) have been identified and placed within the intersection of both concepts. The elaborated theoretical result is regarded as a foundation of the future differential concept which is currently submitted to a number of empirical studies and from which a sketch of the elaborated theoretical foundations are presented as well as first results of their empirical validation, originating from current and modified versions of existing instruments.

Do students metacognitively calibrate to task complexity in hypermedia learning?
Stephanie Pieschl, WWU Münster, *Germany*
Elmar Stahl, PH Freiburg, *Germany*
Rainer Bromme, WWU Münster, *Germany*

While it is clear from a theoretical point of view that only accurate task interpretation can lead to successful self-regulated learning, empirical studies show insufficient metacognitive monitoring, especially for ill-defined and complex tasks. Based on the framework of the COPES-model of self-regulated learning (Winne & Hadwin, 1998) we devised a series of studies that investigate the issues of calibration to task complexity as well as the impact of epistemological beliefs in detail. The first study focused on the preparatory stages of task definition, goal setting and planning and revealed that students do calibrate their judgments to task complexity and that these metacognitive calibration processes are influenced by epistemological beliefs. The results of the second qualitative study focusing on the enactment stage will be presented here. It is an open issue, if students actually do what they plan to do in the preparatory stages. More specifically, we investigated, if students differentiate between tasks of different complexity, use adequate strategies (calibration) and if these calibration processes are impacted by epistemological beliefs. This more qualitative study consisted of two sessions: during the first session students filled in online-questionnaires about learner variables such as epistemological beliefs. During the second session all students (14 biology students and 21 humanities students) were familiarized with our hypertext about genetic fingerprinting (107 nodes) and subsequently had to solve learning tasks of different complexity according to Bloom's revised taxonomy (Anderson et al., 2002). During task completion, logfiles were collected and additionally students were prompted to elaborate on their concurrent thoughts. Retrospective interviews were conducted to get more detailed insights. Preliminary results indicate that students adapt their learning strategies in a meaningful way to tasks of different complexity. Analyses with regard to epistemological beliefs are still pending.

The effects of different scaffolding programs on meta-cognitive skills within computerized science problem solving
Zvia Fund, Bar Ilan University, *Israel*

The paper examines the effect of scaffolding (support) programs on meta-cognitive skills in a computerized learning environment. The environment presents simulations of scientific laboratory experiments followed by qualitative problems that the students are required to solve. Four unique cognitive and meta-cognitive support programs based on human teaching (Scardamalia & Bereiter, 1991) were constructed using different configurations of scaffolding: cognitive (COG) and meta-cognitive (META) support, domain-specific knowledge (DOMAIN) and supplementary enrichment questions (ENR). The support programs, implemented by appropriate worksheets, ranged from low (Enrichment) to full support (Integrated). The scaffolded groups are compared to one another and to a non-scaffolded control group as regards increasing effectiveness of three meta-cognitive skills: (1) self-assessment of the solving process, (2) of the final solution, and (3) in the case of an incorrect solution, identifying the error and its source. Participants were 187 junior high school students, in five experimental groups, each composed of three academic levels. All groups used the same textbook and worked within the computerized learning environment 'Inquire and Solve' (Educational Technology Center, Israel). The treatments were conducted as part of the regular class program, once every two weeks for a period of approximately 6 months. The students were interviewed at the end of the study, and their problem solving activities in the computerized learning environment were observed and transcribed. The resultant protocols were analyzed, each student being assigned an effectiveness score for each meta-cognitive skill. These

scores were subjected to a 5x3 (groups by academic levels) ANOVA analysis. Results showed highly significant differences between the groups in all three skills, and different patterns of effectiveness, depending on treatment and academic level. Further contrast analyses showed a strong effect of COG+META, and a weak or even negative effect of DOMAIN. Both are explained and elaborated upon in the paper.

An analysis of goals and metacognitive strategies of university students' study approach
Ottavia Albanese, University of Milano Bicocca, *Italy*
Caterina Fiorilli, University of Milano Bicocca, *Italy*
Eleonora Farina, University of Milano Bicocca, *Italy*
Barbara De Marco, University of Milano Bicocca, *Italy*

According to the metacognitive approach, an efficient study method requires an active part being taken by the student, who is asked to reflect on: a) his study habits; b) the strategies he uses; c) how he plans, monitors and self-evaluates the whole activity. Academic experience involves autonomous management of the whole process and self-regulated study activity (i.e. assuming a total leadership from a strategic, metacognitive and motivational point of view). In study activity, motivational schemes, achievement goals and use of strategies are strictly interrelated. Disadaptive motivational schemes (Dweck, 1986) are associated with performance goals -meaning both approaching good performances and avoiding failures- (Elliot & McGregor, 2001) and with failure in selection of appropriate strategies. Adaptive motivational schemes are associated with mastery goals -meaning both approaching mastery and avoiding showing incompetence- (Elliot & McGregor, 2001) and with appropriate flexible strategic approach. We investigated changes in study approach while students attended their academic iter, looking for any differences in the choice of achievement goals and study strategies between first and fourth year students. We therefore hypothesised the existence of a relation between achievement goals and self-regulation abilities. We asked students to anonymously answer two open questions on their study method (taken from Albanese and Fiorilli, 2001) and fill in two self-evaluation questionnaires: Questionario sull'Approccio allo Studio (De Beni, Moð & Cornoldi, 2003) and Achievement Goals Questionnaire (Elliot & McGregor, 2001), Italian translation. Results show differences in the use of each achievement goal within a subject but no differences are found between less and more experienced students. Moreover, more experienced students use a more efficient use of strategies. Mastery goals but not performance goals are correlated with a strategic approach.

Assessment of differences in mathematical metacognition of primary school students
Simona Tancig, Faculty of Education, University of Ljubljana, *Slovenia*

The purpose of this study was to investigate the mathematical metacognition according to pupils' gender and their achievements in mathematics, as well as to check the measurement characteristics of the used instruments. The subjects of the study were 94 fifth-grade children from regular schools (mean age of 11 years). Two metacognitive test were applied for assessing metacognition in mathematics. Both test are based of Cornoldi's metacognitive instruments (Cornoldi et al., 1995). Qualitative analyses, descriptive statistics and t-tests were applied to collected data. Cronbach's alpha coefficient was used to check reliability of questionnaire (Form B). Factor analysis was carried out to examine the dimensionality and internal validity of questionnaire (Form B). Using the criteria of gender and general academic success significant differences were discovered in metacognitive knowledge and metacognitive regulation. As for the questionnaires measuring metacognitive processes and metacognitive knowledge, the girls and the group of academically successful students achieved comparatively better results than the boys and less

successful children. The questionnaire of metacognitive processes (Form B) showed high level of validity and acceptable degree of reliability.

Dynamic assessment of analogical reasoning in students with moderate mental retardation: Reasoning capacity limitations or memory overload?
Fredi Büchel, University of Geneva, FPSE, *Switzerland*
Caroline Bruttin, University of Geneva, FPSE, *Switzerland*

The capacity to profit from help in analogical reasoning is a promising predictor for cognitive intervention in special education. However, static analogical reasoning tests do not foster all the information needed for the planning of such intervention. Unfortunately, there still is a lack of standardized dynamic instruments for individuals with moderate to severe mental retardation (MR). We therefore developed the Analogical Reasoning Learning Test (ARLT), which is a standardized dynamic procedure in multiple-choice format (Býchel & Hessels-Schlatter, 2001). In the ARLT, only 1/3 of the students with MR are able to solve more complex tasks. This conforms to the generally accepted belief that the majority of these students are not able to solve complex analogies. However, qualitative analyses indicate these students may not have as much a problem with analogical thinking but a problem of memory overload (Býchel, Schlatter, & Scharnhorst, 1997). In order to test the memory overload hypothesis, a series of Analogical Matrices were constructed (CAM) that prevent memory overload. With this new arrangement 13 out of 15 students who were not able to solve any of the three items of second level complexity in the ARLT were able to solve at least one item of second or higher complexity level on the CAM without help. Some consequences for special educational practice are proposed. References: Býchel, F.P., Schlatter, C., & Scharnhorst, U. (1997). Training and assessment of analogical reasoning in students with severe learning difficulties. Educatio®nal and Child Psychology, 14,4, 83-94. Býchel, F.P. & Hessels-Schlatter, C. (2001). Analogical Reasoning Learning Test (ARLT). Instruction manual (unpublished). University of Geneva, Faculty of Psychology and Educational Sciences.

Diagnostic reasoning strategies used by student and registered nurses in a simulated clinical task
Krystyna Cholowski, University of Newcastle, *Australia*
Robert Cantwell, University of Newcastle, *Australia*

The purpose of this study was to identify the diagnostic reasoning strategies deployed by beginning and experienced nurses when reasoning about a clinical problem. Sixty student and registered nurses took part in a simulated nursing diagnostic task. "Think-aloud" protocols enabled the identification of clinical information, clinical concepts and diagnostic hypotheses used by nurses along with underlying reasoning strategies. Analyses revealed four diagnostic reasoning groups discriminated by differences in the timing and breadth of diagnostic activity and outcomes, and in the use of conceptual and clinical information. Registered nurses were more successful in this process than student nurses. Implications for nursing education and professional development are discussed.

Coeducational or single-sex school: Does it make a difference on high school girls' academic motivation?
Roch Chouinard, University of Montreal, *Canada*
Carole Vezeau, College Joliette Lanaudiere, *Canada*
Therese Bouffard, UQAM, *Canada*

The objective of the present study was to further examine the differential impact over time of single-sex and coeducational school environment on high school girls' motivation in two basic academic domains: language arts and mathematics. Two cohorts comprising 340 girls (7th to 9th grade; 9th to 11th grade) from 8 co-educational and 2 single-sex schools were followed in mathematics or in language arts during a period of three academic years in a longitudinal research scheme. Data were collected with a self-reported questionnaire including several scales: parental support, teachers' support, competence beliefs, utility value and achievement goals. In general, mixed design repeated measures analyses of variance indicated no effect of the environment or of the interaction environment and time of measurement. Significant time effects on several variables indicated a general decline of achievement motivation over time. Consequently, the augmentation of the number of non-mixed high schools, as proposed by some, would constitute an expensive and inefficient social politic, as far as motivation is concerned. Other perspectives, such as the adaptation of the pedagogical practices in class and the addition of options in formation programs, would appear to better support engagement and perseverance of students of both sexes.

D4
29 August 2007 11:00 - 12:20
Room: PP4
Poster Session

Poster session

Chair: **Edit Katalin Molnár,** University of Szeged, *Hungary*

The Role of Writing in Multi-modal Learning in Secondary Science
Vaughan Prain, La Trobe University, *Australia*
Brian Hand, University of Iowa, *USA*
Jim Carolan, La Trobe University, *Australia*

There is now broad agreement that learning science in secondary school entails understanding and linking verbal, visual and mathematical modes to develop knowledge of scientific concepts and processes. While past research has focused on the role of writing for learning in science, and more recently on the integration of different modes, the relationship between these two research agendas has not been investigated in depth. Our paper reports on two case studies that aimed to identify the possible roles of writing in enhancing students' understandings of, and capacity to link, different representational modes to develop conceptual knowledge. Analysed qualitative and quantitative data from two case studies included assessment of student work, focus-group interviews, and classroom observations. The findings indicated that student writing can serve various key functions in relation to effective multi-modal learning in science.

The impact of personal goals on the self-regulated learning and achievement motivation
Éva Molnár, University of Szeged, Department of Education, *Hungary*
Szilvia Jámbori, University of Szeged, Department of Psychology, *Hungary*

Lifelong learning and success in life are largely defined by two factors: the types of goals students have and the degree to which their learning is regulated and intentional. Researchers often use the term intentional learning process to denote goal-directed learning (Linnenbrink and Pintrich, 2001). The role of social support is crucial when setting up goals, which could help adolescents during planning and decision processes. The aim of the present study was to explore the impact of personal long term goals on the self- regulated learning and achievement motivation of adolescents from low income families in Hungary (N=958 mean age:14 years). Results showed that adolescents often mentioned goals related to future education, property, future work and friends. They would like to change their future life and to make it different from their original family environment. This tendency is reflected in the contents of their personal goals. Furthermore, as regards learning strategies, these adolescents mostly prefer repetition and memorization, while their use regulative strategies, monitoring and checking is the least frequently occurring. Their self-reporting shows mastery and achievement motives to be the most highly developed among their learning motives, while anxiety and low self-efficacy seem to be the least developed ones. In summary, low SES students select positive goals which contribute to their success in life and which could play a decisive role in lifelong learning as well. Their self regulated learning does notseem to be different than what was found to characterise that of their peers in large-scale assessments, however, they rely on memorisation rather than on effective learning strategies.

Personal epistemology and mathematics in pre-service teachers in online and face-to-face courses
Farrokh Saba, Department of Educational Psychology, Nevada, *USA*
Lisa D. Bendixen, Department of Educational Psychology, Nevada, *USA*

This study examines the epistemological beliefs of pre-service elementary school teachers who were taking mathematics courses either in face-to-face or in online formats in a department of mathematical sciences at a southwestern state in the U.S. For online students, electronic text (e-text) was used for mathematics content. E-text gave students the opportunity to watch video lectures and receive instant feedback for doing tutorials (problems with guided solutions), homework, and tests. In addition, communication between students and instructor took place by using e-mail and an electronic discussion area, which both facilitated this community of learners. Face-to-face courses were in traditional lecture-type format. Students' beliefs were assessed using several Likert-type surveys. Comparisons were made between epistemological beliefs about distance education, online learning, online learning mathematics, and beliefs about mathematics for online and face-to-face learners. This study will provide evidence to support that online mathematics courses can significantly influence the epistemological beliefs of students, their general views about distance education and online learning, and their beliefs about learning mathematics online. Educational and theoretical significance of the results will also be discussed including implications for learning mathematics in pre-service teachers, the role of epistemological beliefs, and the importance of online learning.

Re-reading during writing: The effect of deficiencies in the text produced so far on writing strategies
Marielle Leijten, University of Antwerp, *Belgium*
Luuk Van Waes, University of Antwerp, *Belgium*

In this research project we are interested in the research question 'What is the function of the textual task environment ('text already produced') on the organization and the process of writing?' Previous experiments showed that writers have different strategies of dealing with the imperfectness of the text produced so far (TPSF). In this experiment we explore the reasons why writers respond differently to deficiencies in the text they are writing. In that perspective, we have analyzed the writing behavior of ten expert writers that used speech recognition to write a business report. Because of its hybrid character, the speech recognition writing mode helps us to bring characteristics of writing processes to the surface that were previously less explicit. Keystroke logging, speech logging and prompted retrospective protocols were used to elucidate the writers' cognitive processes. The data show us two diverse profiles: (a) a handle profile (solve problems in the text immediately) and (2) a postpone profile (delay error correction to a later stage in the writing process. In the presentation we explore different explanations why writers choose these different strategies.

Gender-related differences and motivational aspects of writing a personal account
Carmen Gelati, University of Padua, *Italy*

This study is aimed at analysing the role of individual and situational interest, gender and self-efficacy in writing a personal account and in the interest in the writing of a personal account. One hundred and ninety-two Italian students participated in the study: 72 3rd graders (M = 33, F = 39), 59 5th graders (M = 32, F = 27) and 61 7th graders (M = 32, F = 29). Two events concerning football and dance were arranged in the schools since it had emerged from a preliminary phase that these activities interested boys and girls differently. All children participated in both experiences, wrote texts and completed questionnaires. The results seem to show that individual and situational interest have positive effects on interest in writing personal accounts. Increased interest in writing was observed when children wrote a text on the topic and experience which was more interesting to them. Interest in writing was related with both interest in the topic (individual interest) and especially with interest in the event experienced (situational interest). Independently of gender, boys and girls also wrote better texts when they narrated experiences which were for them more interesting, that is soccer and dance, respectively.

The units of speech Spanish-speaking children represent in writing and the letters they choose to represent them
Sofia A. Vernon, Universidad Autonoma de Queretaro, *Mexico*

During the last two decades, one of the predominant paradigms for children's writing development in the Romance languages has been the work of Ferreiro and Teberosky (1982). In recent papers, some of the main assumptions in this model have been questioned. This paper re-examines some aspects of the model. This paper aims to examine children's writings in Spanish to determine which sound units children represent in writing (to determine if there are syllabic writings), and to analize which letters children use to represent sound units. We also wanted to examine whether consonant letter names influence children's spellings. Two experiments were conducted. The main objective in experiment 1 was to examine the sound units children use to guide their spellings without having to center their attention on the quality of the letters themselves. Experiment 2

attempted to examine segmentation units as well, and to examine which letters children use in their spellings. Both experiments were concerned with the possible influence of letter names upon spellings. In both, children had to write 25 common nouns. In experiment 1, children wrote freely. In experiment 2, they were asked to use non-Latin mobile letters. Participants for both experiments were five and six year-old Mexican kindergartners. Results show that there were a considerable number of syllabic writings, and more than half the children produced syllabic spellings for more than 60% of words with two or more syllables. Monosyllabic words were often represented with two or three letters. Letter names seem to influence spellings in a marginal way. That is to say, children seem to produce more correct initial letters when they match the initial syllables. However, some syllabic spellings did not use any pertinent letters at all, which suggests children are not representing letter names, but the syllable itself.

ICT contribution to improvement of skills in primary education (grades 1-4)
Ilona Koreczné Kazinczi, National Textbook Publishing House, *Hungary*

Improving the quality of education by applying ICT is one of the priorities of most European countries. In the primary education, ICT is part of the compulsory curriculum in most countries. There are two main approaches, when ICT is included in core curriculum. It can be taught as a separate subject in its own right, or used as a tool for other subjects or in some cases both. Hungary follows the mixed model. The National Core Curriculum enables schools to introduce ICT in grades 1-4 as a separate subject. Introducing a new subject is always a challenge. National Textbook Publishing House created a new family of ICT textbook of grades 1-4 and offers support. Previous to introduction of the textbook family, teacher training and pilot project have been done. A part of the pilot project joined in the program of "Promoting Equity Though ICT in Education" (Kárpáti, 2006). The games included in our workbooks evolved the competencies listed below: -recognition and detection of space direction -observation skill -recollection -fine motoric control -cogitation -colour and shape recognition -direction dominance -eye and hand coordination. 26 schools 31 teachers 745 pupils were involved in the pilot project. During the selection process we focused on the diversity (infrastructure of the school, social background and schoolwork of the pupils, etc.). The efficiency of pilot courses was measured by applying worksheets. The tests were done before and after the pilot courses. All the teachers involved the program reported the extreme motivation power of the application of ICT in the education of disadvantaged pupils. The result proves that teaching of informatics in the beginning of primary school improves pupils' skills and produces a strong motivation.

Designing a space for teacher interventions in a wiki learning environment
Andreas Lund, University of Oslo, InterMedia, *Norway*
Ingvill Rasmussen, University of Oslo, InterMedia, *Norway*
Ole Smordal, University of Oslo, InterMedia, *Norway*

A wiki is a collective authoring tool where anyone can contribute, edit, and delete. From previous research (Lund, 2006; Lund & Smõrdal, 2006) we have found that while this type of software is conducive to collective knowledge advancement, it needs to be developed in order to afford more support for such practices. Thus, our aim is to re-design a particular wiki (Xwiki) with such supporting features. There is a dual perspective in our work of merging social and technological support. Socially we develop a teacher mode in the wiki where the teacher can trace and directly support learners' activities by taking part in learners' online activities. This mode is not separated from the learners' but functions as a flexible and quick way of accessing learners' ongoing work. Technologically we develop prompts, reminders and guides for subject specific development.

Theoretically we aim to contribute to an understanding of one particular type of collaborative activity; collective knowledge advancement (Scardamalia & Bereiter, 2006; Hakkarainen et al., 2004). As for educational practice we see the need to prepare teachers and learners for such collective knowledge advancement. This involves going beyond the individual learner as well as the community of practice metaphor (Lave & Wenger, 1991) and working in and with various types of knowledge collectives. In sum, our perspective can be crystallized in efforts to co-develop technology and learning practices conducive to collective knowledge advancement.

Measuring time management strategies by self-report and by learning task
Christoph Metzger, University of St. Gallen, *Switzerland*
Charlotte Nuesch, University of St. Gallen, *Switzerland*
Andrea Zeder, University of St. Gallen, *Switzerland*

Fostering Learning Strategies (LS) is an explicit goal in the three-year curriculum of Vocational Education in Switzerland. Therefore, a program has been started focusing on the following research question: Does the intensive fostering of LS during the three school-years improve both the students' LS-knowledge and LS-use? The use of time management strategies (TMS) is embedded into LS-instruction, because TMS is seen as an important factor for success in school. In order to measure the continuous and final effects of an intensive TMS-instruction and since the exclusive use of self-reports has been increasingly criticized, the students' knowledge and use of TMS was measured by different means at three times. (1) A TMS-inventory as part of a LS-inventory, measuring the generalised use of TMS was given to 90 students from two schools before any TMS-instruction took place. (2) After one year the students were asked to apply their TMS-knowledge by evaluating a 3-school-weeks time management record of a fictitious student. Additionally, the students filled in the LS-inventory again. (3) In the third year, the students were expected to apply actively their TMS while creating a project-oriented, 10-20 pages paper, an authentic task which has to be performed over a few months apart the regular classroom. As a trace of TMS-use the students' personal time management records were collected. Again the LS-inventory was administered. Quantitative analyses were done to answer the following questions: (1) How far did the self-reported generalised TMS-use change during the intervention? (2) How far can students apply their TMS-knowledge by evaluating the TMS-use of a fictitious student? (3) What TMS do students actively use while fulfilling a complex learning task over a longer period of time? (4) What is the relationship between students' self-reported generalised TMS and both knowledge and use of TMS in specific learning tasks?

The practice of planning in project work with ICT
Ingvill Rasmussen, University of Oslo, InterMedia, *Norway*

Teaching and learning practices are rather established in school institutions. Yet, alongside the stability that characterises school institutions new forms of teaching and learning practices have emerged and matured (Cuban, 1993). Theme, project and group-work often in combination with ICT are today enacted on a regular basis in many classrooms particularly in Scandinavia (Bergquist & Säljß, 2004; Klette, 2003). This research investigated how teachers and pupils engage in planning during project work in a primary classroom. The findings show that ICT-rich project work presuppose rather complex skills on the parts of pupils being able to define the task and to plan what to do and how to do it. Learning to plan and structure the ordering of work becomes essential in such learning environments. In fact, the teachers spend most of their time scaffolding the pupils in this kind of work.

Educational uses of ICT in an online learning environment: analysis of an experience in Higher Education
Teresa Guasch, Open University of Catalonia, *Spain*
Anna Espasa, Open University of Catalonia, *Spain*
Antoni Badia, Open University of Catalonia, *Spain*
Elena Barbera, Open University of Catalonia, *Spain*

The incorporation of ICT into educational practices brings with it changes in the way we teach and learn, though, as seen in a number of different studies, these changes or their effects are not due to the technology itself, but to a series of interrelated variables (ie, Salomon, Perkins & Globerson, 1991). Some of these variables are the objective of its introduction, or the educational use made of it, the activities designed, the teaching and learning environment. We focus specifically in this research on the educational use made of the technology, in order to identify, characterise and specify the presence of educational uses of ICT in a teaching process developed on a virtual learning environment. The following data was considered for the analysis: messages between teachers and students in three teaching-learning activities; interviews with the teacher and students at the start, during and at the end of the teaching sequence; self-reports (to teacher and students) which provided us with detailed and continuous information throughout the sequence; subject documents (study plan, teaching material); and, the learning products produced by the students during the three activities. The results allow us to identify and characterise the educational uses of ICT in an educational process in a virtual classroom, specify the frequencies of use and most common concatenations, and the establishment of the relations between the educational uses identified and the different patterns of interaction. Detection of the uses of ICT has been considered intrinsically in terms of concatenation, which requires the identification of the internal and inseparable relations in certain uses of ICT in the development of the different activities in the educational sequence. The results show the most common concatenations, by activity, which highlight the most probable relations in the use of technology in the context of a virtual university.

D5
29 August 2007 11:00 - 12:20
Room: PP5
Poster Session

Poster session

Chair: **Roger Säljö,** Göteborg University, *Sweden*

Assessment in the mathematical classroom – studies of interaction between teacher and pupils
Viveca Lindberg, Stockholm Inst. of Education, *Sweden*
Lisa Björklund Boistrup, Stockholm Inst. of Education, *Sweden*

Is there any assessment going on during "ordinary" classroom work in mathematics? This depends on what we count as assessment. If we consider assessment as a concept with broad boundaries there is assessment going on, explicit or implicit, during every lesson in any subject. Examples of what can be part of assessment are tests/diagnoses, documentation via portfolios, feedback in classroom work etc. In this paper the focus is on formative assessment (assessment for learning) in mathematics and especially the feedback processes between teacher and pupil. Our main focus in

the paper is to explore possible ways to capture this ongoing assessment. The lessons with hands on work, described in this study, are part of a project in which the teachers and researchers worked collaboratively to explore possible meanings of qualities of knowledge the pupils are expected to develop according to the national mathematics curriculum. In part of the video-recordings from the project (two out of four classrooms), we have analysed the classroom interaction. For the analysis, we have used two approaches that appear slightly different. The first analysis employs the concept multimodality (Kress et al, 2001). For the second analysis, Goodwin's (2002) concept "participatory framework" has been used. In the excerpts we used for the analyses, the focuses are on the dialogues between the teachers and their respective group of students, specifically on how the communication contributes to forming the mathematical knowledge. When studying the classroom communication in these situations, we find many incidents of formative assessment – that is communication that can be expected to contribute to the forming of the students' mathematical knowledge. Our conclusion is that these kinds of studies can contribute to understanding the importance of the various kinds of feedback-interaction between teacher and students, especially with regards to what content is established in the classroom.

Learning and instruction crossroads: What paths lead to equations?
Ricardo Machado, University of Lisbon, *Portugal*
Margarida Cesar, University of Lisbon, *Portugal*

Mathematics is stated by many students as problematic. One of the most rejected and feared contents are algebra. But it assumes an important role in compulsory education curricula. Therefore, teachers need to change students' social representations about Mathematics, namely equations, implementing effective ways to promote their performances. One of the decisions that Portuguese teachers make is about the nature of the tasks. When confronted to open tasks students use different solving strategies. Some studies illuminated that adopting collaborative work as a daily practice and associating it to open and significant tasks related to elementary algebra improves students' performances (César, 1994; Céêsar, Perret-Clermont, & Benavente, 2000; César & Torres, 1998). This work is based in two research projects (César, 1994; César & Torres, 1998). The first one is a quasi experimental study and it explored the characteristics of dyad work vs. individual work (equations, 7th grade). The second one is the development of this first project. It studies and promotes collaborative work in school setting to improve students' academic achievement (5th to 12th grade) and it follows an ethnographic approach based in action-research studies. The data collecting instruments were the participant observation (including audio taped peer interactions), questionnaires, interviews and documents. Students' protocols illuminate the existence of five solving strategies: graphic representation (drawings and schemes), a simplification strategy (variable manipulation), by trials, arithmetic and algebraic (equations). These strategies were shaped by students' knowledge and ways of reasoning, but also by the level of complexity of the problems. Students who used a subtractive or algebraic strategy in the easiest problems were the ones who were able to change their strategies into effective ones when the problems were more difficult, i.e., the ones showing a most effective performance had a different pattern of solving strategies.

"Who else wants to get motivated by email?" – Exploring effects of personalised instructional messages in undergraduate general education courses on study habits, motivation, and learning outcomes

Deimann Markus, FernUniversität Hagen, *Germany*

A semester-long field study was conducted to test for an innovative instructional form, "motivational messages" to deliver motivational and volitional strategies in an undergraduate college course. To provide a means for the rational selection, creation, and implementation of such sets of strategies, an integrative model of motivational design (Keller, 1987) was expanded to incorporate volitional theories. The effectiveness of this approach was tested by distributing the strategies as "motivational messages" (Visser & Keller, 1990) in the form of "Study Tips" via email to the participants in this study. Thus, the purpose of the study was to determine whether a combined set of motivational and volitional strategies emailed as motivational messages would improve motivation, persistence, and achievement during several weeks of a semester-length course. Results indicate that the intervention does contribute to improving students' study habits, attitudes toward the course, and learning performance. Moreover, substantial educational and theoretical significances could be derived.

Children academic achievement and some parental dimensions: the mediating effect of children self-esteem

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Ivana Macuka, University of Zadar, Departmenst of Psychology, *Croatia*
Izabela Soric, University of Zadar, Departmenst of Psychology, *Croatia*
Anita Vulic-Prtoric, University of Zadar, Departmenst of Psychology, *Croatia*

Objective: The aim of this study was to determine the contribution of self-esteem and some parental dimensions (behavioral control, psychological control and emotionality of mothers and fathers) to children's academic achievement. Also, we wanted to examine the mediating effect of children's self-esteem on the relationship between these parental dimensions and academic achievement. Method: The research was conducted on the sample of 102 schoolchildren aged 12 to 15 years (66 girls and 36 boys). Children self-esteem was measured with Coopersmith's Self-esteem Inventory - SEI (adapted by Lackovic-Grgin and Bezinovic, 2002). Parental dimensions of behavioral and psychological control and emotionality were assessed with Children Report of Parental Behavior Inventory – CRPBI – 57 (Keresteš, 1999). Children's average final grade at the end of past midterm was used as a measure of their academic achievement. Results: The regression analysis shows that mother's psychological control and children's self – esteem significantly contribute to academic achievement. Baron and Kenny (1976) procedure was used to examine the mediating impact of children's self-esteem on the relationship between parental dimensions and academic achievement. The results revealed that children self-esteem indeed mediate this relationship. Conclusions: Higher academic achievement was positively associated with self – esteem and negatively with mother's psychological control. Children's self – esteem mediated the relationship between dimensions of parenthood and children school success.

Architecture in the Elementary School: The ARCHIMATH Program

Emine Erktin, Bogazici University, *Turkey*
Sema Soygenis, Bahcesehir University, *Turkey*

The built environment in Turkey has been in a state of constant transformation due to internal migration and population increase. Both planned and unplanned developments in line with modern

ideas have accelerated the loss of the local and historic character of the cities. The ARCHIMATH program was developed to initiate a public effort for environmental awareness among elementary school students while improving their mathematical skills. The program covered topics from the elementary mathematics curriculum, and, was based on an introductory course for architecture majors. The program was revised and re-organized after a pilot study and was implemented once more in the selected schools for different groups of students. The final evaluation included subjective views of the teachers taking part in the program as well as the pre- and post-test comparisons of the attitudes of the students towards the built environment. The findings indicated the effectiveness of the course for the development of mathematical ideas and skills and for gaining more positive attitudes towards the built environment.

Effects of problem-based learning in Mathematics instruction for secondary school students
Nur Izzati Abdullah, University Putra Malaysia, *Malaysia*
Rohani Ahmad Tarmizi, University Putra Malaysia, *Malaysia*
Rahil Mahyuddin, University Putra Malaysia, *Malaysia*

Problem-based learning (PBL) is a learning experience in which students are given problems before they experience any instruction in a particular focus area (Tan, 2003; Bridges & Hallinger, 1992). Students in PBL environments typically have greater opportunity to learn mathematical processes associated with communication, representation, modeling, and reasoning (Smith, 1998; Erickson, 1999; Lubienski, 1999). The purpose of this study is to explore the effectiveness of PBL as a mode of instruction for secondary mathematics. A quasi-experimental, non-equivalent control proxy pretest-posttest design was conducted. Two intact classes were randomly assigned to the PBL mode whilst the other to the conventional mode. Paas Mental Effort Rating Scale (PMERS) and Statistics Achievement Test were used to measure the effectiveness of the intervention. PMERS was developed by Paas (1992) to measure the total amount of controlled cognitive processing in which a subject is engaged during problem solving. In the experimental group, the researcher posed a a problem for the students to solve before giving instructions, notes, worked examples. Students were required to discuss in their PBL groups methods of data collection and presentation. Students are instructed to go through their textbooks, notes on class interval prepared by the teacher. At the end of the lessons, students presented their solutions and submit their group-work to the teacher. The control group learned the same Statistics topic the conventional way. At the end of the instruction, both the Statistics Achievement Test and PMERS were administered to both the experimental and control groups. Preliminary findings indicated that there were no significant differences in mathematics achievement and measures of instructional efficiency between the PBL and conventional group.. However findings of this study provide initiatives and support from teachers and school management on the implementation of PBL in learning mathematics and other school subjects.

When written numbers become useful to solve an additive problem
Monica Alvarado, Universidad Autonoma de Queretaro, *Mexico*

At this study, we inquired about the influence of written numbers in the solution that children do to additive problems. This is to prove that a conventional graphic external representation could make children to get a different perspective of cardinality. In this intention, thirty Mexican children (4 to 6 years old) were asked to answer a classical Mexican school additive problem: "Box game" (SEP, 1990). At this experimental situation, children were asked to establish the number of counters contained in a box before two transformation actions (counters were added in a rank of 3 to 8). This task was presented in two modalities, with and without the written form of numbers involved

in each transformation. Most of the children solved the "Box Game" task counting each one of the added counters in the box. This kind of responses have been reported in many similar studies (Nunez, 1983; Fayol 1985, Parra & Saiz 1992, etc). Although these systematical responses, when written numerals were presented in the task, some children prove more advanced solutions: they determined the number of counters added in one part of the transformation (most of the times, the second one) and complete the solution counting the rest of the elements, but recovering the quantity supported by the written form. These responses correspond with the ones described as the beginning of the incorporation of cardinality concept in many research works (Maza, 1989, Fuelabrada, 1991, Lerner 1992, etc). Our study opens the discussion around two main ideas: a) the design of the experimental situations (even though they were studied in a didactic context) and the conditions they improve to get the best children's responses; b) children ability to manage written numbers and to employee them in the understanding of the additive problem.

The effects of domain expertise on reference searching with the PubMed online tool: an experimental study.

Nicolas Vibert, CNRS - Universite Paris 5, *France*
Jean-Francois Rouet, CNRS - Universite de Poitiers, *France*
Christine Ros, CNRS - Universite de Poitiers, *France*
Melanie Ramond, CNRS - Universite de Poitiers, *France*
Jerome Gatefin, CNRS - Universite de Poitiers, *France*

Higher level students and researchers in biology and medical sciences regularly use the PubMed online search engine (http://www.pubmed.gov), which provides access to the MEDLINE bibliographic database. Despite a lack of formal training to this tool, PubMed has become the gold standard of French neuroscientists for work-related information seeking. Sixteen neuroscience experts of doctorate level or above were asked to perform 5 bibliographic search tasks on various topics within their field of expertise. Objective measures and concomitant verbal protocols were used to assess their behavior and performance. Despite a variable knowledge of the PubMed search tool, neuroscience experts were able to find and select in a limited time adequate references for each task. Sixteen expert biologists of matched professional experience, who were regular users of PubMed but not integrative neuroscience specialists, were asked to perform the same search tasks. Despite their lack of knowledge in neuroscience, as demonstrated by their slower and more frequent reading of the instructions for the tasks, non-expert researchers could find and select adequate references with the same efficiency as neuroscience experts. However, differences were observed between the way experts and non experts proceeded, as exemplified by the larger number of keywords included in the requests to PubMed by non-experts. These data suggest that a high level expertise in a broad scientific field like biology can compensate for an often superficial knowledge of online information search tools, even if the participants are not specialists of the specific domain in which references are searched for. For well-defined reference search tasks in neuroscience, a minimal experience in using PubMed and/or online search tools can compensate for the absence of expertise in neuroscience. However, the mistakes made by high-level researchers using PubMed stress the need for inclusion of formal training to online search tools within higher education programs.

A study of pupils' science learning behavior in heterogeneous/homogeneous groups
Chia-Ling Chiang, National Univ. of Tainan, *Taiwan*
I-Che Chung, Cishan Elementary School, *Taiwan*

The purpose of the study was to understand pupils' learning behavior in heterogeneous/ homogeneous groups. This study proceeded in a primary school at a satellite town and lasted for eight months. Thirty-six forth-grade pupils of two classes participated in this study, and students with high/low ability were removed from his/her group in different stages. Classroom observation with the checklist, named: "the Checklist of Groupworks in Science Learning" was conducted. After analyzing the data qualitatively and quantitatively, it was found that the low-ability students had better performance in homogeneous group than in heterogeneous group (p . But high-ability students showed the similar behavior in homogeneous group and in mid-heterogeneous group with lower ability ($p > .05$). In addition, some of the low-ability students would engage in group activities and cooperate with others in homogeneous group, but some of the high-ability students who used to be the leaders in heterogeneous groups showed off-task behavior in homogeneous group. It showed that the learning behavior of a student was indeed influenced by group members. Besides, it was also found that whatever the group was heterogeneous or not, the interaction structure of groups became stable swiftly after removing students. It is worth noting that the interaction structure of each group is quite similar, that is, only 1-3 members are engaging in group tasks, other members are just idle around. It implies that the group interaction is influenced by a wider and deeper belief/value of culture, which needs more studies and discussion.

Modelling children's conceptual thinking in an inquiry-based learning environment: towards an integrated description technique
Marjatta Kangassalo, University of Tampere, *Finland*
Kristiina Kumpulainen, University of Helsinki, *Finland*
Satu Vasama, University of Oulu, *Finland*
Eva Tuominen, University of Tampere, *Finland*

This paper is challenged by the question of how to model and describe the development of conceptual thinking and exploratory learning in the social context of a multimedia environment in an early year's science classroom. The study investigates the development of conceptual thinking among young children aged between six to eight years old in an activity context in which children have to opportunity to spontaneously explore and model natural and astronomical phenomena using traditional and multimedia tools. The data for the study has been collected by means of pre- and post-interviews and video-recordings of children's spontaneous, self-initiated explorations in the learning environment in question. The analysis methods are based upon theories and concepts derived from cognitive and social psychology, cognitive science, studies of discourse and social practice and they aim at highlighting the socio-cognitive dynamics in collaborative knowledge construction (Kumpulainen, Salovaara & Mutanen 2001) as well as the processes of children's conceptual thinking in an open, tool rich learning context (Kangassalo 1997). The paper considers the potential and challenges of theoretical and methodological triangulation in the investigation of conceptual thinking and learning among young learners as an aim to develop an integrated, dynamic and visual computer technology- based description technique. The first steps and examples towards the description technique are described.

D6
29 August 2007 11:00 - 12:20
Room: PP6
Poster Session

Poster session

Chair: **Fritz C. Staub,** University of Fribourg, *Switzerland*

Designing instructional examples to promote problem-based learning: Self-regulated use of continuous examples vs. segmented solution steps.
Florian Schmidt-Weigand, University of Kassel, *Germany*
Martin Haenze , University of Kassel, *Germany*
Rita Wodzinski , University of Kassel, *Germany*

How can worked examples be designed to promote self-regulated problem-based learning? In two experiments students of the 9th grade attended in pairs (experiments 1 & 2) or alone (experiment 2) to physics and chemistry problems. In both experiments learning was supported by either continuous or segmented worked examples, the latter being obtained by segmenting the continuous examples into solution steps. In order to further promote the students' elaboration on the worked examples each step in the segmented condition was preceded by a prompt that suggested auxiliary learning activities (e.g. strategic considerations and/or communication). Both prompts and solution steps ("feedback") were given on separate sheets. Students self-regulated when to attend to the next prompt or solution step. Experiment 1 (N=60) revealed that segmented worked examples designed in this fashion were superior to more common continuous worked examples in measures of learning outcomes (retention, transfer) and the quality of communication within pairs. Communication quality, however, did not mediate learning outcomes. In order to explore if peer interaction contributes to the positive influence of segmentation with prompting anyway, we further varied in experiment 2 (N=146) if the segmented or continuous worked examples were attended in pairs or alone. The results confirmed the superiority of segmented over continuous worked examples while pair learners did not gain higher learning outcome scores than singles.

Teacher education in Quebec at the crossroad of new competencies
Teresa Visca, McGill University, *Canada*

In the recently revised teacher-education curricula in Quebec, the focus is on 12 competencies, mastery of which is assumed to represent excellence in teaching. However, a serious challenge presents itself: the competencies themselves, as well as the knowledge, attitudes, and abilities surrounding them, need to be clarified. Currently, the conceptualization and the evaluation of competencies are being questioned by all the partners involved in the training of teachers - that is, teacher educators, students, practitioners, administrators and ministry officials - and the need to address this issue is urgent. Failure to do so will result in decreasing standards in teacher education in Quebec, leaving the province behind the standards set by the international education community. The first years of practice are already extremely difficult ones, and graduating teachers who have not been trained properly will teach poorly, depriving their students of the indispensable intellectual formation they deserve. In order to assist in this process of definition, my study addresses the following questions with the aim of contributing new knowledge to the issue of competencies in teacher education. How are competencies defined and operationalized?

What do they mean to and for students and practitioners? What do they look like in practice? How are they evaluated? What assessment instruments need to be privileged? How are quality of preparation and quality of performance assessed? My research methods include scheduled, standardized interviews and spontaneous interviews, which have been conducted at the University de Montraal, where I have been involved in teacher training for over fifteen years. My theoretical framework draws on Vygotsky's social activity theory (Vygotsky, 1930). I also consider the work of authors such as Lave and Wenger (1991), who shed light on the progressive construction of teacher identity generated in a social and collective, rather than individual, paradigm.

Learning to communicate: the emergence of autoregulatory speech in children's message formulation

Conchi San Martin Martinez, Facultad Psicologia. Universidad Barcelona, *Spain*
Maria Isabel Navarro Ruiz, Blanquerna. Universitat Ramon Llull, *Spain*
Carmen Oliver, Facultad de Pedagogia. Universidad Barcelona, *Spain*

In the Vygotskian theses of the internalization of social speech as a key point in the emergence of verbal thought, one of the most important aspects is what is known as private speech: that is, verbal productions that seem to regulate and guide the action underway (Vygotsky, 1934/1987). Traditionally, this process was studied with children engaged in tasks in non-communicative contexts. However, an approach of this kind may not account for a key point in Vygotskian theory: the emergence of private speech associated with requests for help from other persons present. We aimed to study the progressive differentiation between autoregulatory and heteroregulatory utterances through an analysis of private speech in a communicative situation in which children were asked to communicate unambiguously a series of objects. In a longitudinal study we observed ten pairs of boys and girls at 4, 6 and 8 years in the presence of an adult, engaged in a referential communication task. Among our results, we found that at 6 and 8 years there is a greater sensitivity to communicative ambiguity, resulting in a greater presence of autoregulatory forms. Similarly, we found that the sources of cognitive challenge were not only defined in the difficulty of the referent per se, but are clearly related to the intervention of the other person. Private speech seems to be a useful tool to understand the links between metacognition and children's collaborative processes. Therefore, we emphasize the importance of relocating the study of private speech in the context of a task under way, and advocate the use of methodologies and data analyses that allow us to understand these processes in all their complexity.

Potentials for learning or problems in students understanding

Anna-Karin Carstensen, School of Engineering, Jönköping University, *Sweden*
Jonte Bernhard, Eng. Ed. Res. Group, ITN, Linköping University, *Sweden*

As the title – Potentials for Learning or Problems in Students Understanding – suggests, we propose that there is a need for the two becoming distinguished analytical categories in research in education within the disciplines. The research in Science education has for a long time dealt with misconceptions of single concepts, although one of the common objectives in many subjects is "to learn relationships". The research on threshold concepts is dealing with concepts that are related, and is thus opening up a new dimension of the research on understanding. Although many of the studies on threshold concepts also deal with how to make learning possible, there is a risk that studies end when the problems are found. We suggest that a clearer differentiation between "problems" and "potentials for learning" is made. Our proposal is to distinguish between ways to identify threshold concepts and ways to identify what needs to be addressed in order to open up learning spaces. We propose the term 'key concepts' for those concepts that open up the 'portal'.

We try to explore how a threshold concept may become identified, how we by studying video recordings from labwork propose a way to see what is troublesome within the concept, how the use of variation theory can open up new dimensions in the learning space, thus finding keys to open up the 'portal', and how, again by video transcripts, we can evaluate the new learning sequence. In this research we have found our model of learning complex concepts to be very valuable.

The Social Presence in asynchronous online learning environments: online identity
Eulalia Torras, UOC, *Spain*

Social presence, cognitive presence and teaching presence have noticeable roles in the theoretical models which analyze interaction between professor and student and the interaction among companions in electronic learning environments based on written asynchronous communication tools. The Social Presence is the ability of the apprentices to be projected social and emotionally in a community of virtual reflection. The porpoise of this report is to analyze one of the basic dimensions of the Social Presence: online identity. Two types of online identity have been found: personal online identity and group online identity. Both of them contribute to asynchronous communities of discussion in higher education learning process. In the context of the three platforms of e-learning (Knowledge Forum, Moodle and the Open University of Catalonia own one) we collected asynchronous communications that were written for 46 participants in three processes of teaching-learning. The analysis of the written communication shows the construction procedure of online identity as well as the influence of this at the construction of participants' knowledge.

Generic skills in the beginning of university studies among theology students
Laura Hirsto, University of Helsinki, *Finland*

In this paper self reported strengths in generic skills are explored among first year theology students. The concept of generic skills has been under critical discussion. For example Barrie & Prosser (2004) suggest that the discussion about generic skills in higher education has been somewhat policy driven instead of research or theory driven. There have been discussions about the relation between generic skills or attributes and personality factors. It has also been questioned, how general generic skills really are (cf. Neumann, Parry & Becher 2002). It is clear that more research on generic skills on different disciplinary areas is needed. In this study, 139 first-year students in the Faculty of Theology completed a questionnaire in which they evaluated their own skills on a number of areas. The skill items were designed on the basis of a study by Lizzio & Wilson (2004). Principal axis factoring produced an interpretable solution of seven factors. According to the data, the first-year theology students had highest evaluations of their skills on the interpersonal dimension. Significantly lower means were reported on the factors of conceptual and analytical skills, resourcefulness and decision-making, written communication and information management skills, self-management and oral communication. Significantly lower from all other factors was rated the factor of learning skills and adaptability. Implications of the findings are discussed.

Students' stories as a promoter of developmental transfer between work and education
Anneli Sarja, Institute for Educational Research, *Finland*
Sirpa Janhonen, University of Oulu, *Finland*

The purpose of this paper is to describe how the narratives of social work students promote developmental transfer between work and education in Finland. Students' stories were based on their experiences during their practice period in child welfare work/family work. The stories gave students (N=6) and their teachers (N=4) a possibility to share their experiences, ideas and knowledge base concerning current practice in family work. The data were collected in seminar sessions (20 min per story) that were videotaped and transcribed in 2005. According to the findings, the students' stories helped them and their teachers to discuss the same topic. Three types of narratives emerged during the seminars: 1. how to discuss a difficult topic with the client (focusing on early intervention), 2. how to set limits for an aggressive child, and 3. how to develop shared responsibility concerning problem behaviour in a child. The study suggests that there is a need to develop collaboration between the multiprofessional team and families around the questions that emerged from the students' narratives. Moreover, we suggest that students' narratives are a good method of bringing forth new ideas for developmental transfer when integrating higher education, working practice and research.

Where is the threshold in understanding the concept of evolution?
Charlotte Taylor, University of Sydney, *Australia*

Threshold concepts include instances of 'significantly changing the way of thinking', and a focus on the integrative nature of knowledge (Meyer and Land 2005), and can be identified in all areas of biology (Taylor 2006. An understanding of evolution is clearly transformative (Entwistle pers comm.) in that it requires both a fundamental change in the way we think about living systems and a sophisticated integration of knowledge within biology. This study focused on students who were first encountering concepts fundamental to biology, at a level where thresholds concepts should be most evident. The aim of this study was to carry out a detailed analysis of first year student responses to a question about evolution, to identify the defining characteristics of the threshold concept. A hierarchical scale of understanding was developed to score the answers, based on the SOLO taxonomy (Biggs and Collis, 1982). While the prestructural, relational and extended abstract categories were clearly identified in student responses, a problem arose in categorizing responses at the multi-structural level of understanding. We hypothesized that this indicated the existence of a threshold at this level, and a re-analysis using a phenomenographical approach allowed us to create categories of understanding in which each higher order category is inclusive of all lower order categories (Marton 1994). Such a building of understanding mirrors the transformation and integration of ideas inherent in crossing thresholds (Meyer and Land 2003). The analysis produced distinctly different categories of understanding, which take into account the essential features of evolution. These categories give a picture of the 'critical aspects' which make up the threshold concept (Cope 2006), and using these critical aspects we can now design learning materials and activities which specifically show students how to make links and see relationships.

Student-centred discussion as an on-line vicarious learning resource for educators in speech and language therapy

Barbara Howarth, Newcastle University, *United Kingdom*
Julie Morris, Newcastle University, *United Kingdom*
Richard Cox, University of Sussex, *United Kingdom*

This paper describes a methodology for capturing students' learning experiences for use as an on-line vicarious learning resource in the domain of speech and language therapy. This work forms part of a 3-year project which aims to add and evaluate vicarious learning resources to an established on-line learning resource called PATSy (www.patsy.ac.uk – Cox and Lum, 2004). Vicarious relates to the notion that students benefit from access to the learning experiences of others learning (Chi et. al. 2001; Cox et. al. 1999; Laurillard, 1993; McKendree et. al. 1998). To capture students' learning experience, a set of focussed questions, known as task-directed discussions (TDDs) were developed to elicit student-student and tutor-student discussions which focussed on key issues in clinical reasoning. The TDDs addressed specific learning difficulties experienced by student informants who used PATSy to assess a "virtual patient" in the domain of speech and language therapy (project refs). Video recordings were made of student-student and tutor-student discussions using trainee and expert speech and language therapists as informants. The TDDs were then edited using video-editing software (Pinnacle Systems Inc, Pinnacle Studio) and student-student dialogues were matched with tutor-student discussions for content. The resulting video clips were incorporated into the PATSy database. A study to evaluate the effectiveness of student-student dialogues and tutor-led dialogues as a vicarious learning resource is currently underway.

Success of a pedagogical innovation named 'researcher workshop' in helping prospective teachers to understand the importance of research skills

Mari Murtonen, University of Turku, *Finland*
M. Mikkila-Erdmann, University of Turku, *Finland*
Tuike Iiskala, University of Turku, *Finland*

A pedagogical innovation named "researcher workshop" was implemented at the department of teacher education at the University of Turku in late 90's. The workshop aimed at reducing students' problems in learning research methods and helping them to see the relevance of research skills for their future work. An important goal of teacher education programs is to graduate teachers who have the necessary skills to be both consumers and producers of educational research, and who are able to act as role models for pupils in problem solving situations with "researching attitude". In this presentation, the theoretical foundations of the researcher workshop are discussed in detail and experiences from a researcher workshop are presented. The purpose of this study was to compare two groups of students. The first group participated in a more traditional research curriculum and the second group studied in the researcher workshop environment. We interviewed students and compared their views and perceptions on the need of research skills, as well as the difficulties that they experienced in the learning of research methodology. We also examined how supervisors in the researcher workshop have experienced the innovation and how they thought it helped students to learn. As a result, the researcher workshop was able to reduce students' difficulties in learning and helped students see the relevance of research skills.

Supervising Masters research students: Project paper versus thesis
Vijay Kumar Mallan, Universiti Putra Malaysia, *Malaysia*
Shameem Rafik-Galea, Universiti Putra Malaysia, *Malaysia*

Supervising postgraduate students is a challenging experience as it involves building life long skills. The process of scaffolding the learner is paramount in achieving many of the goals of postgraduate studies. One of such goals is to enable the researcher to become an autonomous researcher. There appears to be a gap in knowledge about postgraduate teaching/learning practices in some institutions where Masters‚ research students are given a choice to either complete a research project or do a thesis as part of the requirements of the research degree. While the thesis may be considered a fully-fledged scholarly research which is subject to external evaluation, the project paper may be viewed as one that is less demanding as it is not subject to any form of rigorous evaluation. This study reports on a study that was conducted to identify the influence of the scale of academic output (project or thesis) on the scaffolding of students to autonomous researchers. Preliminary findings suggest that both the supervisors and the research students have the view that doing a project paper is terminal as such, training to become an autonomous researcher is not viewed favourably. A number of factors influence this perception and these include institutional practices, examination policies, cultural influences and the demographics of the research students. On the other hand, a thesis is considered a step towards further intellectual pursuit and thus is viewed as a process that warrants the development of a student to an autonomous and independent researcher.

D7
29 August 2007 11:00 - 12:20
Room: PP7
Poster Session

Poster session

Chair: **Éva Molnár,** University of Szeged, *Hungary*

What happens to thinking skills programmes in schools? The case of ACTS (Activating Children's Thinking Skills) in Scotland
David Leat, Newcastle University, *United Kingdom*
Lucy Tiplady, Newcastle University, *United Kingdom*
Kate Wall, Newcastle University, *United Kingdom*

This paper uses a case study approach to investigate what happened to a well established Thinking Skills programme, ACTS (McGuinness 2002) for primary aged pupils, when it was introduced into schools in one area of Scotland over a 3 year period. In particular, this evaluation focused on what impact the programme had on pupils, teachers and schools and how transferable the skills were when pupils transferred from primary to secondary schools. Data comes from project documentation, a questionnaire completed by teachers involved in the project and interviews with local authority staff, teachers, headteachers and pupils. The pupil interviews included the use of Pupil Views Templates (Wall and Higgins 2006) with both current primary pupils and pupils who have transferred to secondary school. These templates have been shown to enable the exploration of pupils' thinking about learning and thinking (metacognition) (see Wall 2006). The teacher

interviews included eliciting responses to videos of ACTS lessons in this project. The analysis shows that there are substantial differences in pupil outcomes between schools, not least in terms of the metacognitive skilfulness evidenced by the pupils. The paper explores the range of factors that have influenced the response of pupils, teachers and headteachers, which broadly reflect the culture of the schools and some teacher characteristics. The primary schools all show varying degrees of 'meshing' ACTS with other initiatives and interests, a form of organisational social construction, which means that ACTS is slowly merging into a wider pedagogy, blurring its identity.

The transition of knowledge between educational and professional discourses
Harriet Jakobsson Ohrn, The National Swedish Police Academy, 170 82 Solna, *Sweden*
Gunilla Petersson, Stockholm University, *Sweden*

The aim of this study is to examine how students in higher education, undergraduate and further education, handle the transition between two institutional contexts - the educational setting and the professional setting - in order to make sense of course content in relation to their future occupation. The paper takes its point of departure from nursing and police students' perspectives and will describe the transition of knowledge between the educational and professional discourses. Vocational education, both undergraduate and further education, is mostly based on experience from the practical discourse in order to exemplify the theoretical course content. Practical experience from the field is taken, with help of professionals into the education, but also makes use of the students' own experience from the field. The purpose of using experience knowledge is to help the student make a transition between the more decontextualized educational setting and the professional setting in order to facilitate their learning process. But what are the students' perceptions of this arrangement? Can they see the underlying purpose, or is it only blurring their own learning process?

Strategies for supporting development of problem solving skills
Zane Olina, Florida State University, *USA*
Eric Sikorski, Florida State University, *USA*
Tristan Johnson, Florida State University, *USA*
Jeff Sievert, Florida State University, *USA*
Wayne Slabon, Florida State University, *USA*

Several researchers have suggested that case-based instruction can help students adopt the characteristics of expert problem-solvers. The purpose of this study was to examine instructional strategies for facilitating development of expert-like problem solving skills, including pre-case analysis, case discussions in small groups of peers, interactions with expert practitioners, and individual reflections about the case analysis process. The study was conducted in a graduate-level capstone seminar for instructional design students revolving around analysis of a series of case studies. We will present results of our analysis of student work and their responses to surveys and interviews, and discuss types of support that learners require in case-based learning environments.

Assessment for Learning in Higher Education: interrogating practice and theory
Liz McDowell, Northumbria University, *United Kingdom*
Catherine Montgomery, Northumbria University, *United Kingdom*

This paper presents work from a national Centre for Excellence in Assessment for Learning (AfL). The AfL approach is based on a set of theoretically underpinned principles. These promote:

authenticity and complexity in the methods of assessment; advocate a sparing use of summative assessment and increased provision of formative assessment; aim to build students' confidence and sense of autonomy; and promote informal feedback and peer interaction. The research programme investigates AfL practice in real-world settings within higher education. A case study design is used with multiple methods of data collection, and a fine-grained, interpretive approach. Initial analysis is at the case level to generate holistic interpretations, taking into account a range of perspectives. Cross-case analysis identifies key themes and illuminates theoretical constructs. Findings identify ways in which perceptions of students, teachers and others are crucial to the experience and outcomes of AfL. In the English Literature case study, students perceive significant value in peer feedback and discussions but the research also reveals the fragile sense of self amongst students and identifies circumstances in which students feel silenced within the peer discourse. The fine-grained detail of students' observed learning behaviour provides essential contextualisation and moves away from generic findings about the student group. One example is variation in students' discernment of principles and concepts within English Literature. Students' approaches to writing assignments showed some recognising a 'pattern' between the texts they were analysing and the ideas and perspectives of the course, whilst others concentrated on the task they had been set, 'checking off' the elements achieved, but failing to address wider issues and concepts. We also highlight AfL as an evolving process, influenced by teacher reflection-in-action, student responses and a wide range of contextual factors, many of which are unpredictable.

Choosing teaching as a second career among men
Ilana Avissar, The Kibbutzim College of Education, *Israel*
Nurit Dvir, The Kibbutzim College of Education, *Israel*

This research examined men, in contrast to women, who decided to retrain as teachers for a second career. The research goals were to examine the motives provided by these men for their choice and to analyze their perceptions regarding family, career, gender-roles and the teaching profession. The research employed a mixed-methods research design and was conducted in a large, centrally-located teacher-college in Israel. As part of the qualitative research, open-ended interviews, seeking participants' life-stories, were conducted with 14 men studying to become teachers. As part of the quantitative research, a self-report questionnaire was filled-in by 30 men and 21women retraining as teachers. Findings indicated that the primary motives for both groups in choosing a teaching career were internal. Men, as opposed to women, received higher levels of appreciation from their immediate social circle regarding their choice. Their decision was perceived as more courageous, different and challenging of societal norms. Both the men and the women considered the teaching profession to be appropriate for men, and expressed innovative attitudes regarding family, gender-roles, career and teaching. The innovative aspect was expressed in the priority they gave to the choice of a profession that enabled them to fulfil their familial and parental roles over a profession that was prestigious and high-paying. The findings indicated that these men perceived themselves as having 'feminine' qualities such as sensitivity, compassion, empathy and gentleness. Men were more open to experiencing a variety of roles that are free of a gender-label. Publicizing the phenomenon of men choosing teaching as a second career may encourage more men to seek employment in other helping-professions and in doing so to improve their public image. This may signal a conceptual change that could paint women's professions in new colors and breach the existing binary nature of perceptions about men and women's professions.

Evolution of five types of stress chronicity profils: an exploratory study
Michelle Dumont, Universite du Quebec a Trois-Rivieres, *Canada*
Danielle Leclerc, Universite du Quebec a Trois-Rivieres, *Canada*
Suzie McKinnon, Universite du Quebec a Trois-Rivieres, *Canada*

The study of the relationship between stress, psychosocial adaptability and academic achievement in adolescents is a research area that is rapidly developing. Yet, few studies analyze the individual differences existing in the way adolescents experience stress. In order to compensate for this lack of information, this study examines the changes observed over time in the personal resources, academic achievement and psychosocial adaptability of five groups of students while their stress level was stable (low, average or high), increased or decreased between the 9th and 11th grade. The first results indicate that the higher stress level group is made up of mostly girls from secondary three (grade 9) and secondary five whereas the lower stress level group is mostly made up of boys. The results regarding the longitudinal participants show that the best trajectory towards academic achievement, the development of positive personal resources and psychosocial adaptability is associated to the group of students whose stress levels decreased between the middle and the end of high school (increase in general academic achievement, self-esteem and autonomy; decrease in interiorized disorders). However, the worst trajectory was taken by the group of students whose stress level increased during that same period of time (decrease in French marks (mother-tongue language); increase in the use of unproductive or social coping strategies; intensification of interiorized disorders). These results suggest that it is necessary to develop practical intervention tools in order to avoid the development of stress or even worse that it intensifies during adolescence.

Violence in schools: What does game theory have to say about hitting back among children with behavioral disturbances?
Amos Fleischmann, Achva Coll. of Education, *Israel*

The level of violence in schools is still high today. Children with behavioral disturbances, especially those disturbances connected to impulsive behavior, display more violent behavior than those who do not have disturbances. The development of game theory has done much to advance our understanding of the dynamics of conflict. An important subject for the understanding of the development of conflicts and their resolutions is the concept of retaliation (Schelling, 1980). Hitting back in schools has rarely been studied. This study investigated the attitudes of children and parents towards hitting back. A Likert-type questionnaire of 6 ranks was used. The questionnaire was designed with the purpose of investigating the factors influencing patterns of attitudes of children and their parents concerning hitting and the policy of teachers. The analysis of variance showed that the family role (F=(3)6.2, P and the special needs (F=(1)16.7, P had statistically significant effects on attitudes toward hitting back. Boys in general and boys with specials needs in particular, most strongly supported the attitudes of hitting back. Most of the boys (61%) and a larger majority of boys with specials needs (79%), agreed that they would hit back if attacked. This study shows that the majority of boys have positive attitudes toward hitting back. As expected, children from special education are more involved in hitting back. The respondents claimed that they would hit back children with behavior disturbances less than regular children. It appears that this attitude stems from the ineffectiveness of hitting children back who have little self-control. Game theory predicts that in conflicts between two parties, when one party is not in control, it is advisable to weigh the matter before responding in like by hitting back because the violence that will be displayed by this party is not a product of rational thought.

Community of knowledge- a conference as a place for exposure and distribution of professional knowledge
Dvora Gesser, Kibbutzim College of Education, *Israel*
Zipi Zelkovich, Kibbutzim College of Education, *Israel*

This longitudinal study (2001-2005) examined the contribution of a two days conference to the professional knowledge of third and second year students of the elementary school department of the Kibbutzim College. At the conference, third-year students presented action researches conducted by them as part of their training. A qualitative research method was employed to assess its impact on participants in the conference. The 3rd year students reported improvement in their professional abilities, they see themselves as a source o; knowledge and they developed skills of paper presentation, proud of their research's achievements and the ability of working as a team

Using phenomenography combined with knowledge space theory to study students' thinking patterns in defining an atom
Zoltán Tóth, University of Debrecen, *Hungary*
Lajos Ludányi, Berze-Nagy J. High School, *Hungary*

Research in science education during the last twenty years has shown students' difficulties and misconceptions about the concept of the atom. This study investigates how students describe atoms when they are presented with an open-ended question, and what hierarchy their responses can be arranged in. 730 students (grade 7-11, age 12-17) from 17 Hungarian secondary schools were questioned. Students' responses were analysed by phenomenography (Marton, 1986) similarly to those that were done in the case of 239 high school students (grade 9-12) in the USA (Unal and Zollman, 1999). Categories extracted from the students' responses were (a) units of matter; (b) constituents of an atom; (c) model of an atom. The connection between these categories was determined by using knowledge space theory (Doignon and Falmagne, 1999). Results show that generally the 'model of an atom' is built on the 'constituents of an atom', and the category 'units of matter' is separated from the other two categories. However we found inverse connection between categories 'constituents of an atom' and 'model of an atom' in grade 9 in Hungary and in grade 10 in the USA. The probable explanation for this exception is that students learn a lot about the models of an atom in grade 9 in Hungary, and they deduce the constituents of the atom from the model of the atom. In the case of Hungarian 11th graders we have not found any connection among the three categories mentioned above. This result shows that students' knowledge structure regarding the concept of the atom disintegrates after finishing chemical studies at school. (This work was supported by OTKA – T049379.)

Development of intercultural competence in a blended-learning context
Inge Herfort, Vienna University of Technology, *Austria*

Thomas' model of developing intercultural competence is discussed in the context of a blended-learning module for students wanting to improve on their intercultural competence in business settings. Thomas describes intercultural competence as "the ability to recognize, appreciate and honour the cultural influence on perception, judgment, emotion and behaviour within oneself and with others and to apply this ability in a productive manner" (Thomas 2006:118). In this study an answer is sought to the question if and how Thomas' model can be applied to improving intercultural business competence by doing qualitative interview research in the field of cross-border business, by using e-learning tools and by combining these e-learning tools with periodic meetings of these students in small discussion and reflexion groups. Theoretical basis of this

blended-learning module is a four-step model. It is examined if and how it is possible to improve intercultural competence by going through four steps of developing intercultural competence: 1. intercultural confrontation, 2. intercultural experience, 3. intercultural learning and 4. intercultural understanding.

Contests over the meaning of special students in the US
Hugh Mehan, UCSD, La Jolla, CA, *USA*

What do schools do with children who are difficult to teach or who are troublesome to manage? Such students, no doubt, have always been present in our schools. Yet the way we talk about students, and hence the way we act toward them, has changed significantly from the beginnings of the US to the present time. The history of special education has been a contest over the representation of students who are difficult to teach. A moral discourse in which students' educational difficulties were seen as sinful behavior dominated early Colonial times in the US. When waves of immigrants–especially those from Eastern European and Catholic countries, shifts in populations from the country side to the city, and urbanization transformed the US into an industrial nation, students' educational difficulties were accounted for in a new way. Faulty socialization and bad mothering on the part of new immigrants was blamed for students' difficulties in school. In the 20th Century, the development of psychometric measures coupled with a demand for greater educational efficiency, generated a psycho-medical discourse in which the source of school difficulty was placed within children's brains–rather than their soul or heart. Despite this shift, the source of school difficulty remained beneath students' skin and between their ears. A social discourse, in which school difficulties are attributed to environmental, cultural, socio-economic or familial factors has competed with the psycho-medical discourse in which school difficulties are attributed to genetic or organic causes. After years of contestation, the psycho-medical discourse has dominated, beating back a variety of social explanation for students' school difficulties–for reasons I will explore in the paper.

Transforming teachers' construction of student diversity through Collective Argumentation
Raymond Brown, Griffith University, *Australia*
Peter Renshaw, school of Education, University of Queensland, *Australia*

Research on student diversity typically frames it as an individual trait, or capability. Rogoff & Guttierez (2003) contrasted this "trait" approach to diversity with the sociocultural approach that treats diversity as situated and produced in social and institutional practices. Empirical studies of teachers' understanding of diversity (Paine, 1989; Achinstein & Barrett, 2004) have identified four frames that teachers have typically deployed to categorise students: an individual differences orientation, a categorical orientation based on considerations of social categories such as gender class and race, a contextual orientation that locates patterns of difference between students at the intersection of psychological, biological and contextual influences; and a pedagogical perspective. In this paper, we suggest that these orientations are inadequate because they fail to consider the way institutional practices and everyday interaction patterns in schools actually produce and construct differences between students. To capture this dynamic process, we tracked across a one-year period a group of eight teachers who were part of a "teaching experiment" on Collective Argumentation which promotes a more participatory and dialogical process of classroom interaction. We focussed on how teachers' perceptions of students were changing as their own pedagogy changed. Each teacher was interviewed about their students whilst watching a video-taped episode from his/her classroom. We were interested in their accounts of how particular students had changed during the year and what categories and labels they deployed to describe

their students. The teachers provided accounts of transformation in their students' engagement in learning activities. Teachers were found to be developing a new language for describing student diversity – a language not based on nominal categories with their implied set of stable traits – but rather based on descriptions of shared practices and different repertoires that students were adopting as members of a particular classroom community.

D8
29 August 2007 11:00 - 12:20
Room: PP8
Poster Session

Poster session

Chair: **Sangeeta Bagga-Gupta,** University of Örebro, *Sweden*

Conceptual and situational factors in children's understanding of the earth
Karin Ehrlen, Stockholm University, Department of Education, *Sweden*

The aim was to link different contexts in a learning situation by describing children's understanding of the earth in relation to conceptual frameworks, situation and culture. Semi-structured interviews were accomplished with fifty-eight children, mainly between six and eight years old, in the presence of visual representations of the earth. Group 1 was interviewed with a globe, group 2 with a satellite photo of the earth, group 3 with one globe and three pictures showing different aspects of the earth, and group 4 was interviewed while they were producing their own drawings of the earth. In spite of the information given in the different visual representations of the earth, many children expressed conceptions of the earth that deviated from the culturally accepted concept. Also some children, who themselves drew pictures of the earth in line with conventional ways of depicting the earth, expressed alternative conceptions. The difficulties the children encountered are described from a conceptual point of view as differentiating between the astronomical conceptual framework of the earth and the common sense framework of the earth nearby, from a physical point of view as relating different perspectives from where the earth can be seen, and from a cultural point of view as interpreting different modes of depiction. Additionally, the children's understanding of the relevance of different explanations in the situation was considered. The interaction between the conceptual and cultural factors in children's understanding of the earth entailed that an alternative interpretations of mode of depiction in a representation could support an alternative conception of the earth. Practical relevance of the study is that cultural knowledge, for example knowledge of the conventions for depicting in a particular subject area, should be recognized as part of a science curriculum.

ScaMo - Studying and scaffolding motivation and self-regulated learning among elementary school students
Sanna Järvelä, University of Oulu, *Finland*
Hanna Järvenoja, University of Oulu, *Finland*
Kirsi Juntti, University of Oulu, *Finland*
Marjaana Veermans, University of Turku, *Finland*
Heikki Kontturi, University of Oulu, *Finland*

Studying effectively by self-regulating learning is itself a skill powered by will. Learners apply this skill with varying expertise. Unfortunately too few are experts in self-regulation, but fortunately learners can be taught to study more effectively. Our main argument is that in spite of strong understanding of self-regulation in learning – there is still a limited understanding about how self-regulation develops in learning context and especially how motivation regulation contributes to it. This study will investigate the roles and forms of motivation in self-regulated learning. Specifically, we will analyze students' motivation regulation during studying in real contexts, and examine opportunities to support motivation regulation with a computer-based regulation tool and by teacher support. The three objectives are: 1) Theory: What is motivation in self-regulated learning and what are the elements of motivation regulation?, 2) Documentation: What is motivation regulation in practise? How do elementary school students regulate their motivation as they study in classrooms? And 3) Application: Is it possible to scaffold students' motivational regulation with a computer-based tool that is coordinated with teacher scaffolding in a learning task? A pedagogical framework for applying study computer tools and Learning Kits in Science will be described and the first results of our empirical experiment and intervention among grade three elementary school will be reported.

Career choice motivations of bedouin teachers enrolled in a special education teacher training program
Efrat Kass, Achva Academic College, *Israel*
Erez Miller, Achva Academic College, *Israel*
Jamil Abuajaj, Achva Academic College, *Israel*

The purpose of the present study was to examine the career choice motivations of Bedouin teachers enrolled in a special education teacher training program. Paradoxically, there was a gradual increase in the enrolment of veteran Bedouin teachers to the program, despite negative perceptions and attitudes toward children with special needs which are prevalent in the southern Israeli Bedouin society. A qualitative method of analysis was selected for this study both because this was a pioneering examination of the subject in the southern Israeli Bedouin society, and because of the attempt to collect as rich information as possible from the participants. 18 male and female teachers were interviewed using semi-structured interviews. The results reveal several motivations: Practical, altruistic, personal challenge, social, and career-related. The results of the present study could be useful as a resource for developing an instrument for mapping career choice motivations and for developing a teacher training program that will be tailored to the needs and interests of this unique group.

The evaluation of an educational system toward its monitoring and piloting
Claude Houssemand, University of Luxembourg, *Luxembourg*
Philippe Wanlin, University of Luxembourg, *Luxembourg*

This paper presents the methodologies and results of an evaluation of adult apprenticeship ("Apprentissage pour adultes"), a second chance qualification in Luxembourg. Several research questions can be put forward. For example, why is there a continuously increasing number of people who want to join this apprenticeship while only 40% of applicants obtain an apprentice position? The evaluation of the measure involved a cyclic succession of four key-steps: - Data collection: Three sources where consulted: quantitative data from the Luxembourg Unemployment Agency; qualitative data obtained through interviews with managers administering the measure, adult apprentices, teachers and employers; and quantitative data obtained through surveys of 100% of applicants to the measure. - Comparison: We generated indicators from the quantitative, qualitative and survey data to respond to the research questions. - Determining corrective actions: After investigation we suggested possible corrective actions and ways to implement them. - Implementation of solutions: The suggested actions have not yet been implemented; this would be the next step of the work. The study has shown that the main aims and objectives of the measure have been reached but many questions remain unanswered due to an unclear definition of the measure's aims and the multiple (partially contradictory) objectives of the measure. The current evaluation has led to the planning of a piloting system of the measure. Results show that the assessment of the measure has to be widened to include curriculum assessment, process-product analysis, employers' surveys, and systematic evaluation by developing a computation of automatic indicators.

The influence of item properties on the difficulty of EFL reading items in Germany
Astrid Jurecka, German Institue for International Educational Rese, *Germany*

During the last years, foreign language skills have become more and more important in many different contexts all over Europe. The EBAFLS (European Bank of Anchor Items for Foreign Language Skills) – Project belongs to the Lingua2-Programme of the European commission. Its aim is to build a bank of anchor items for the assessment of three foreign languages (English, French and German) and two language skills (reading and listening), which are comparable across different countries and thus lead to culturally fair and comparable test results. This presentation is focusing on the German sample of the EBAFLS 'Reading English' study. One unexpected result of the study was that most of the English reading items which showed differential item functions in Germany, which means that those items are either significantly easier or more difficult for the German students compared to students from other countries, were items which had actually been constructed in Germany. Furthermore it turned out that approximately half of the items which showed DIF were in fact more difficult for the German students. Different analytic steps have been conducted to explain these differential item functions. One step was to find out if certain item properties might be responsible for making an item more or less difficult by using these item properties as predictors for the item difficulty within a Linear Logistic Test Model. Results of these analyses, possible implications on cross-cultural language testing as well as recommendations for further research are going to be presented and discussed.

Science in the mind's eye of girls – The bearing of motivational context conditions on self-concept and interest
Sandra Winheller, Graduate Research Program, *Germany*

The potential to learn science content is known to be complicated by a number of factors, among them gender, identity, and interest. The present study focuses on gender differences and sex-specific development in self-concept and interest of students who take introductory chemistry classes in grade 7. The study utilizes data from the "Chemistry Project" which is part of the research initiative "Educational Quality of Schools" (BIQUA) sponsored by the German Science Foundation (DFG). Questionnaires and videotape data of approximately 109 students (51.2% girls, median age of 13 years) from two German High Schools who participated in a quasi-experimental intervention study (2 x 2 design) were analyzed. Central variables for the analysis included: a) the degree of student orientation (here: academic self-concept, self-efficacy and interest) and b) the support of autonomy and competence by the teacher as motivational context conditions.

Secularization and religious education – a perspective from a Finnish rural context
Tapani Innanen, University of Joensuu, *Finland*

This study examines the contexts in which the children of a rural village in Eastern Finland have related to the learning of religion. Special interest is paid to the question of what way secularization can be detected in the development since the foundation of the Finnish elementary school. The study is based on methods of historical, sociological and curriculum research. Lutheran parishes were the only countryside authorities until the 1860s when local municipalities were separated from the church. At the same time a law was enacted regarding municipal elementary schools. In the beginning of the 1920s the Freedom of Religion Act was made law, and, at the same time, Finland introduced compulsory education. The school had to arrange religious teaching in accordance with the confession to which the majority of school pupils belonged. Although the bond between the state educational system and the church weakened, the local situation did not change. The confessional Religious Education continued also when it was after the World War II culturally and politically criticized. The Lutheran rites of passage – baptism, confirmation, marriage and funerals – maintained their importance in the local community. The Freedom of Religion Act was renewed in 2003, and since then the school has not had any confessional religious education but the pupils must receive "teaching in their own religion". Secularization can be seen in three dimensions:1) differentiation of social structures, 2) decline of religion, 3) privatization of religion. Concerning the first dimension, Religious Education in schools has become totally secularized during last 150 years. The macro state level is secularized, but the positive freedom of religion emphasizes individual religious rights in micro level. Religious Education is motivated individually but not marginalized into privacy.

Religious adolescent sex education through the Internet
Zehavit Gross, Bar-Ilan university, *Israel*

The aim of this article is to analyze the internet Israeli religious Shut (in Hebrew - questions and answers) service concerning modern orthodox adolescents' sexuality. This article will focus specifically on one website of one of the most popular Rabbis serving among adolescents. A content analysis of 150 internet correspondence on this website will be conducted enabling us to portray the cultural and religious world of these modern orthodox adolescents as well as the nature of the conflicts and dilemmas which occupy their existentiality. Due to various reasons, the religious school system avoids the issue of sexuality although it was meant to be part of the

curriculum. They call it family studies or issues between him and her but not sex education. The teachers are threatened by the need to address explicitly intimate questions which will challenge their religious dispositions. The Shut project is a means to revolutionize sex education with a systematic and creative e-learning system, supplying adolescents with basic sexual knowledge alongside the creation of a legitimate religious discourse of sexuality. This e-learning system cultivates sexual literacy as it encourages adolescents to read more about it. Apart from its serving as the only address, the Shut program succeeds in constructing a sense of responsibility and accountability among adolescents, and it tries to construct a process of sanctification of sexual life. Actually, the Shut service fills the educational void with an alternative effective landscape of sexual education.

Inter-cultural conflict resolution in groups of Arab and Jewish educational counselors
Daniela Kramer-Moore, Oranim Academic College, *Israel*
Michael Moore, Technion - Israel Institute of Technology, *Israel*

Social stratification and the formation of subgroups are universal correlates of group behavior. Such processes take place in families, in various secondary groups, as well as in entire cultures and societies. One frequently observed form is a dichotomization of the social environment into Us vs. Them, through an exaggerated emphasis of the differences between these two subgroups. Various competing hypotheses have been offered to explain these phenomena; some of them are drawn from social, clinical or family psychology, others lean on anthropological and biological axioms. Whatever their source, these potentially destructive processes serve as a major ground for interpersonal conflict at both the micro and macro levels. Within the framework of a master degree program in educational counselling, a year-long course (The Helping Interview graduate workshop) was shared by Arab and Jewish Israelis. Through the consistent application of principles drawn from Rogers humanistic approach, Seligman's positive psychology and Kohut's self psychology (such as empathy, self-knowledge, teamwork, tolerance, mutual respect), the interpersonal dynamics within this group drastically changed throughout the year; these changes have been evaluated by both pre-post attitude scales (also administered to a control group), and the continuous observation of both verbal and non-verbal behaviors. The two ethnic subgroups, distant and frequently hostile at the beginning of this course of study, merged into a cohesive unit by the end of the year.

YOUNG LOOK: Values, taste and dressing habits of Hungarian secondary school pupils - report about a nationwide research
Emil Gaul, Moholy-Nagy University of Art and Design, *Hungary*
Andrea Kárpáti, Eötvös Lorand University of Sciences, *Hungary*

Aims Have a detailed picture about the taste and appearance of secondary school pupils, to give a solid basis for a children-based art and design education. Detect the number, and size of sub-cultural and cultural groups characterised by appearance existing at present in Hungary. Methodology The research has been run by questionnaires and illustrated questionnaires, so called 'stile-sheets'. More than the half of the sample were photographed. Data gained were statistically processed then characteristic figures were analyzed and conclusion was drawn. An expert group made the selection and typology of dresses onpictures. The project had a preparatory phase, and after it the main research was executed. Findings The pilot project showed eight different groups of young people. We found, that these groups are not sub-cultural, but they differ from each other in consuming habits. We draw out the type of the main groups, characterised by the socio-economical background, and variants according to values, cultural preferences, and dressing

habits. Dressing had been found as an effective tool in differentiating consumer groups. Theoretical and pedagogical significance This research gave a typology of young Hungarian people (mainly the age cohort of 15-16), according to their values, taste and dressing habits. It was shown the eclectic manner of their music and television consumption, reading and eating habits and dress wearing. The illustrated questionnaire was found a sensitive and effective measuring instrument in search for visual qualities.

Examining multicultural views of the good teacher in Israel, as a tool for developing potential for teaching and learning
Sara Arnon, Tel-Hai Academic College, Golan Research Institute, *Israel*
Nirit Reichel, Ohalo College, The Kinneret College, *Israel*

The research compares perceptions of the good teacher as viewed by people of different genders and sub-cultures in Israeli society: Arabs, and Jews of various levels of religiosity (religious, traditional and secular). These comparisons will help to understand the social factors influencing similarities and differences of the good teacher's portraits in a multi-cultural society. 377 Israeli born adults of a representative sample were asked by telephone: a. Open-ended questions: What are the most important characteristics of the good teacher? b. Closed questions: Respondents ranked the importance of 11 characteristics of the good teacher by a 0-10 scale. The qualitative and quantitative data analysis (to be completed shortly) includes: a. Content analysis of the verbal answers. b. Comparison of the characteristics of the good teacher between the different multicultural-multiethnic groups. c. Profiles of the good teacher by Discriminate Analysis. Preliminary findings revealed three core categories of the good teacher: teaching knowledge, ethical person and educator and teacher-student relationships. Generally, the Israeli public mostly values the good teacher as an ethical person and an educator, especially his/her moral personality; and as someone who maintains good relationships with students, mainly by being empathetic and attentive; and values teaching knowledge to a lesser extent. There are little differences between genders, but the religious-cultural factor is a significant source of difference. The research contributes towards understanding the values and perceptions of different ethnic, religious and social cultures regarding the important components of education and teaching, when the important qualities of the teacher are placed at the centre of the educational process. This, in turn, will contribute to better harmony between the educational system and teaching, and the different and varied multicultural approaches. These research insights will be applicable to the development of improved potential for suitable teacher education, teaching and learning in a heterogeneous society.

Does intuition influence the accuracy of forecasts on stock market? A repetition study
Christian Harteis, University of Regensburg, *Germany*

Research on professional expertise theoretically indicates intuition as a crucial component of professional expertise (Eraut, 2000). This study focuses on intuition in the domain of investment. Subjects of different levels of expertise are compared in their forecasts on stock markets. The purpose is to investigate the accuracy of intuitive and rational forecasts. In a first study in 2005 intuitive forecasts have been better than rationally justified ones. A repetition study – ending in December 2006 – tests the finding of the 2005 study.

D9
29 August 2007 11:00 - 12:20
Room: PP9
Poster Session

Poster session

Chair: **Kristiina Kumpulainen,** University of Helsinki, *Finland*

New religious education curricula for Finnish minority groups – An example of different approaches to religious education
Arto Kallioniemi, University of Helsinki, *Finland*

In Finnish tradition religious education is taught according to pupils' own religion in comprehensive schools. Evangelical-Lutheran religious education is the form of majority religious education in all the schools In addition to evangelical-Lutheran RE in Finland there are many other forms of RE. The new curriculum for minority religious education groups was accepted in 2006. The aim of this research is to study the minority religious education curricula. In spring 2006 the Board of Education in Finland accepted the curricula for minority religious groups (Adventist, Catholic, Bahai, Buddhism, Good's people (Protestant Society) Islam, Judaism, Krisna-Society (ISCON), Kristi-Society (Steiner Society), Free Protestant Church). The Greek Orthodox religious education curriculum is also including in the minority groups curricula. The purpose of investigation is to look at how the three perspectives of religious education (learning religion, learning about religion and learning from religion) are profiled in these curricula's. Another aim of investigation is to look at how these curricula emphasized the development of an individual's religious identity and on the other hand how the idea of religious literacy is portrayed these curricula. The research method is content analysis. Some curricula are based mainly on the learning religion approach and on learning about religion. In many minority groups religious education curricula the central idea is to confirm the religion's own religious identity. The interpretation of religious all round literacy is very diverse in the minority groups' religious education curricula. The curricula of minority groups' religious education describe the diversity of religious education in Finnish society in the beginning of the 2000's.

Novice teacher, do you still want to continue teaching next year?
Sarah Shimoni, Levinsky School of Education, *Israel*
Gonen Chava, Levinsky School of Education, *Israel*

Since 2000, a full year of internship became mandatory for all students of the teacher training colleges in Israel. Researchers studying the experience of being a first year teacher, describe it, using metaphors such as "shock", "trauma", "uprooting", etc. (Kremer Hayun, 1985; Sabar Ben Yehoshua, 2001; Regev and Sagii, 2001, and others). In light of these findings there's great importance in identifying the various components of the induction process and their relative contribution to the interns welfare. In the Gonen, Shimoni and Yaakobi study (2002) five induction agents were identified: (1) the principal, (2) the mentor, (3) the inspector (especially in pre-school), (4) the school faculty and (5) the internship workshop. In addition, five major induction factors were identified: (1) Initial orientation (2) social acceptance by the school staff (3) backing when problems with students and parents arise; (4) pedagogical support (5) emotional and mental support. The study examines the contribution of these induction "agents" and factors, to the intern teachers' job satisfaction and commitment. 198 interns, at the end of their internship year,

were asked to fill a questionnaire, inquiring about the various induction agents' and components' roles in their induction, their job satisfaction and their commitment to continue teaching. Results showed a significant positive relationship between the interns' job satisfaction and their perception of the contribution of the various induction components and agents. School principals' involvement, and the initial orientation the intern receives, were found to predict job satisfaction (b=**26.), (b* 43. =). It is recommended to make clear to the principals the immense importance of interns' initial orientation, and their own role in the interns' induction.

The evaluation of reconstructed elementary curriculum by primary teachers
Isa Korkmaz, Selcuk University, *Turkey*

In 2005-2006 the reconstructed elementary curriculum (1-5 grades) began to be implemented in the Turkish elementary schools. The aim of this study is to indicate the perceptions of the primary teachers about new curriculum after the first year of implementation. In order to collect data, a form consisted of five open-ended questions related to the reconstructed curriculums of courses (Reading and Writing, Turkish Language, Knowledge of Life, Mathematics, Social Studies, and Science Education) was developed to examine the teachers' perceptions about the new curriculum. The teachers' view for each course were divided into three subdivision; a, advantage of each course of the new curriculum; b, disadvantages of each course of the new curriculum; and c, suggestions of the teachers to improve the new curriculum for each course. The questionnaire was employed to 250 primary teachers. Results indicate that in general most of the primary teachers have positive attitudes about the new curriculum. However, the implementation of the new curriculum have some difficulties because some schools do not have enough sources, some classrooms are so crowded, parents do not have enough information about the new curriculum, and primary teachers do not know exactly how to evaluate students' activities.

How concept-based instruction facilitates students' mathematical understanding
Nobuyuki Fujimura, Nagoya University, *Japan*

International studies such as PISA2003 have revealed that East Asian students are good at mathematics, especially at applying procedural knowledge. However, students of some Asian countries, such as Japan, are not so good at verbally explaining their solutions to problems which require conceptual understanding. This study examined the effects of concept-based instruction on students' conceptual understanding and on their discourse styles in classrooms. Two classes of Japanese 9th graders (n=81) learned mathematics in either a concept-based style or a standard style for one year. In the case of concept-based instruction, students always engaged in mathematics problems which allow for multiple solutions. After they solved each problem individually, they discussed various solution strategies to the problem in a classroom. In the case of standard procedure-based instruction, students engaged in relatively many problems and a teacher often explained one solution strategy to each problem by using the students' own words. The results of pre- and post-tests revealed that students in the concept-based class improved their performance on conceptual understanding problems significantly more than those in the standard class. The former students also expressed their ways of thinking by their own words more often than the latter students on the posttest. Moreover, a longitudinal analysis of discourse processes in each class showed that students' constructive explanations composed of everyday words increased in the concept-based class and stayed higher than those in the procedure-based class.

Epistemological beliefs in child care:
Jo Brownlee, QUT, *Australia*
Gillian Boulton-Lewis, QUT, *Australia*
Donna Berthelsen, QUT, *Australia*

The quality of child care is of social and economic significance worldwide. A large body of research now demonstrates that the formal pre-service education of child care workers is one significant way in which quality child care, and outcomes for children, can be improved. In particular, the beliefs that child care workers hold about relationships with children are related to beliefs about children's learning and epistemology but such characteristics are not often the focus of professional preparation programs. This study investigated the nature of beliefs about knowing and knowledge (epistemological beliefs) for 77 child care students participating in a 2 year competency based training program which prepared them to be group leaders in Australian child care centres. The findings revealed new ways of thinking about evaluativistic beliefs, which have not been reported in the literature to date. "Practical evaluativism" is focused on a view of knowledge as the construction of evidenced-based practice rather than knowledge as is the case for evaluativistic beliefs. Implications for child care practice and training programs are discussed.

The use of discussion as a means of learning primary science: Problems and issues of innovative pedagogy
Farhana Zaman, Nottingham Trent University, *United Kingdom*

This paper reports on the findings of a research project which was designed to help children to use discussion as a means of developing their joint understanding within a primary science context. A case study located within a Key Stage Two class is discussed below. The impact of small peer group discussion on children's collaborative learning is presented. By examining the interaction between children talking about lifecycles in human beings, it is possible to indicate how these children may have helped to develop each others understanding of this area and further how they might use discussion as a strategy to develop their ability to learn across the curriculum. Optimum group size for discussion and the personal learning styles (as indicated by the children and their teacher) are examined and the relevance of this on the dynamics of the discussions which ensued is considered here. The development of a method for enabling children to engage in and sustain discussions with a science focus is elucidated upon. How well individuals within the groups understood that the method provided could help them to sustain their discussions seemed to be related to how well they understood the value of the method as a way of increasing their independence and possibly to how well individuals adapted to new situations as displayed through the social semiotics they exhibited on the video recordings taken of the groups in discussion.

Planning work - student activity in the primary classroom
Kerstin Bergqvist, Linköping University, *Sweden*

In the Swedish comprehensive school, teachers' lecturing is to a great extent being replaced by a pedagogy involving students' individual and self-directed studies. Students are supposed to have influence over and take responsibility for their own work and learning. This paper aims at scrutinizing conversations between teacher and student concerning students' planning of their weekly work. The research is carried out as a field study in a Swedish primary school. Three groups with 18 students in each are being followed. Each group has its own teacher (female). Data is collected by means of observations and field notes, audio tape-recorded teacher instructions and conversations between teacher and student. There is a clear focus on meta-cognitive aspects

concerning ability to plan one's own work. It is also obvious how forms of disciplining are intertwined with activities, not least as concerns study behaviour and children's use of time. The emergence of specific forms of communication in this teaching and learning context implies an increasing bureaucratisation of schooling. Results will give insight into what this organization of teaching and learning does when it comes to defining students as successful or not, and in which ways teachers' work and the character of institutional knowledge is transformed.

Finding an index of a student-centered classroom discussion using Inter-utterance Quotation Network Analysis
Eiji Tomida, Kyushu University, *Japan*

The present study proposes a new method for analyzing classroom discussion process. This method is called Inter-utterance Quotation Network Analysis (IQNA) that was developed with the concept of inter-textuality and network analysis. Using IQNA, researchers can obtain visualized representations of discussion process and indices of qualities of discussion. Although IQNA proposes several indices for quality of discussion and explorative analysis devices, the present study focuses on finding an index of how much a certain classroom discussion is actively managed by students and examining validity of it. Establishing such an index is very important task for educational research, since student's active engagement in a classroom discussion is crucial for their knowledge construction. A reading comprehension unit for sixth- graders in a Japanese elementary school was examined with IQNA. As a result, it is found that "teacher's frequency rate of being quoted by students" is most appropriate as an index of student-centered classroom discussion.

Resolution of word problems and interaction in the classroom when there isn't agreement between teachers and students. A comparison between expert and preservice teachers.
Javier Rosales, University of Salamanca, *Spain*
Jose Orrantia, University of Salamanca, *Spain*
Santiago Vicente, University of Salamanca, *Spain*
Jose Maria Chamoso, University of Salamanca, *Spain*

In this paper differences between three in-service teachers and three pre-service teachers when solving arithmetic word problems are shown, by analyzing what both the students and the teachers did in the classrooms when there had problems to establish a public content. More concretely, the analysis system we've developed involves three different levels: what is made public during the interaction, how is made public and, finally, who made it (student, teacher or both). This way of interaction analysis allowed us to study how both in-service and pre-service teachers react when there is no agreement between teacher and student in their classroom. The main result found is that while the pre-service teachers didn't finish successfully some of the cycles in their interactions with students, the in-service teachers never began a new cycle without closing successfully the previous one. That is, while the in-service teachers guaranteed the generation of a coherent public content (sometimes by providing children with the public content when they were not able to give the correct answer), the pre-service teachers did not do the same but they usually began a new cycle although the student had clearly showed that there is no agreement regarding the public content that could be extracted from this cycle. Educational implications are discussed.

Collaborative peer groups in large biochemistry classes: Maintaining a focus on conceptual learning
Marian Dobos, RMIT University, *Australia*
Carmel McNaught, Chinese University of Hong Kong, *Hong Kong*

We have previously reported on the design of a new teaching initiative for Year 2 Biochemistry involving collaborative learning in peer groups (PGs), conducted in parallel with formal lectures. Responding to recent significant increases in class size and student diversity, we have designed a new development of this program with Year 3 and 4 undergraduate students as PG learning mentors. In this paper we describe the design and implementation of structured student-directed activities aimed to promote conceptual learning within this large class PG setting. These included exercises aimed to reinforce and broaden the key concepts (KC) covered in lectures, the construction of a topic concept map (CM), and the identification of 3 major areas of difficulty (AoD) per topic. A topic seminar was delivered by one PG, while the remaining PGs submitted written supportive documentation on their AoD. All student submissions were posted in the course electronic repository. Evaluation of the project processes and outcomes consisted of questionnaires, focus groups and lecturer analysis of student work. A positive student response to the project was supported by learning mentor feedback. The continuous reinforcement of the learning of biochemical concepts, identifying KC, and the seminars were identified by students as the most useful elements of the PG project. A focus on conceptual learning was achieved through a number of structured student activities in PGs within a large undergraduate class. Eliciting and building on students' prior knowledge, active engagement with content material, the diversity of the metacognitive capabilities of the PGs, and making explicit connections between concepts were some of the approaches of the PG project that assisted student learning. Using these educational principles as a framework, we have designed a successful collaborative learning program in PGs that supports and assists student learning of Biochemistry in a large class setting.

Motivation and processes of social co-construction of knowledge during CSCL
Cornelia Schoor, Chemnitz University of Technology, *Germany*
Maria Bannert, Chemnitz University of Technology, *Germany*

Collaborative Learning is believed to have positive effects, due to (among other things) processes of social co-construction of knowledge such as externalization and elaboration, elicitation, conflict and integration (c.f. Fischer et al., 1998; Weinberger & Fischer, 2006). However, negative effects of collaborative learning and computer supported collaborative learning (CSCL) are also documented (Renkl et al., 1996; Hron et al., 2002). In order to support cooperative learning, Slavin (1992) assigns group rewards on the basis of individual responsibility which obtains its positive effect through motivation. There is convincing empirical evidence that motivation influences learning outcomes in the context of conventional learning scenarios (c.f. Schiefele, 1996). The cognitive-motivational model of learning (Rheinberg et al., 2000) postulates that enduring motivational attitudes influence actual motivation. Actual motivation in turn affects knowledge acquisition via the mediator's time on task, learning activities and functional state. In this study, the model by Rheinberg et al. (2000) was applied to collaborative learning by identifying the „learning activities" of the original model with processes of social co-construction of knowledge. In order to examine the relationship between motivation and knowledge acquisition, actual motivation was manipulated by choosing a learning topic which should produce a great variability in learners' interest and by experimentally varying the presence of a group reward sense Slavin (1992). As the dependent variable and process variables respectively, knowledge acquisition, time on task, functional state and processes of social co-construction of knowledge were measured. A

positive interrelation between on-line motivation and knowledge acquisition during CSCL was found. However, group rewards as well as the analyses of processes of knowledge co-construction showed unexpected effects. In order to incorporate these results, the underlying model is modified and discussed by taking into account both individual and collaborative learning phases and processes.

How teachers use cooperative learning to develop potentials for learning
Hafdis Gudjonsdottir, Iceland University of Education, *Iceland*

Few will probably question that the primary goal of the public school system is to foster student growth and development and the outcome is a direct result of instructional interaction between the teacher and her students and between students. If we believe that schools are about students' learning and that learning in schools occurs primarily through the attempt and ability of teachers, then it becomes clear that school reform should focus on sustaining and developing the teaching profession. In this paper I will introduce some findings from a collaborative action research conducted with seven elementary teachers in Iceland. The focus in the research is on how these teachers use cooperative learning in their teaching as they develop learning for capacity for their students. Our interpretation and analysis is that the students are working better together than before and that cooperative learning serves well for group processing in the classroom and for sustaining learning.

D10
29 August 2007 11:00 - 12:20
Room: PP10
Poster Session

Poster session

Chair: **Andrea Kárpáti,** ELTE University Faculty of Science, *Hungary*

Does ICT change school?
Liisa Ilomäki, University of Helsinki, *Finland*

Both educational researchers and policy-makers had high expectations about using ICT in education for transforming educational practices; there have also been several innovative pilot studies which show results of inspiring changes in teaching and learning practices when using technology. These expectations have, however, not come true in ordinary schools, which have not similar resources and interest for development. The problems lay mainly in the policy of implementation process. It is not enough to provide schools with technology, or train teachers, or even to support teacher communities, if the existing educational system does not allow deep-level changes e.g. in teachers' work, in curriculum, and in the structures of a school day. The paper is based on analysis of empirical findings, and the conclusions are made especially from the Finnish context.

Transitions in VET; the switch between pre- and secondary vocational education
Ellen Klatter, Erasmus Universiteit Rotterdam, *Netherlands*

Vocational education in The Netherlands aims at several general goals. The improvement of the quality of future employees' competencies (life long learning) and a decrease of the number of dropouts. To facilitate students' life long learning, they not only have to acquire vocational competencies, but also learning competencies and develop professional attitudes. However, aiming at students' life long learning, educational institutes for pre- and secondary vocational education should stream the curriculum content of their educational programmes, and adapt the didactical en pedagogical methods used, in order to facilitate the students continuing development of competences during the transfer from pre- to secondary vocational education. In the Netherlands, a project has started aiming at the development of a continuing learning arrangement in vocational education in the branch of Metal/Metalektro. Therefore, 13 schools for primary and secondary vocational education and their related companies participate in the project. Preceding the actual development of the learning materials, a preliminary research is organised among participants of the project to investigate their opinion about the status quo of the connection between primary and secondary vocational education. For this purpose, a questionnaire was developed concerning four domains of learning: A) coaching for career planning, B) content of the curriculum, C) evaluation and judgement of the learning process, D) didactical/pedagogical methods. Additionally, secondary school students are asked about their experiences with respect to the transition from pre- to secondary vocational education. Preliminary results of the questionnaire will be presented by focussing on three research questions: How do students experience the actual learning environment with respect to the four domains mentioned? How do their teachers value the learning environment with respect to the four domains mentioned? What kind of improvements do these participants mention on the four domains?

Conceptions of teaching excellence held by reviewers of teaching awards
Graham Gibbs, University of Oxford, *United Kingdom*
Keith Trigwell, University of Sydney, *Australia*

Reviews of the operation of teaching award schemes in higher education suggest that they have many operational flaws, especially in terms of the kinds of evidence that are made available by teachers to be judged by teaching award panels (MacDonald, 1998). However these are not simply practical problems. To specify appropriate kinds of evidence to be reviewed, and to have aligned criteria for making decisions about such evidence, requires that there is a coherent and aligned notion of what teaching excellence consists of. This paper reports part of a study in which the espoused model of teaching excellence of a wide variety of teaching award schemes in several countries, as evident in scheme documentation, was compared with the conceptions of teaching excellence underpinning decisions about applications for awards made by award panel judges, and related to alternative conceptual models of teaching excellence (e.g. Trigwell, 2001). Interviews were conducted with three panel judges from each of 10 university teaching award schemes in four countries. Judges' conceptions of excellent teaching were elicited by discussion of individual applications for awards that were successful or unsuccessful. Phenomenographic analysis was undertaken on the interview transcripts. The paper will report the categories of conception of teaching excellence held by the judges and highlight the degree of alignment of these conceptions with the model of teaching excellence of the award schemes and the adequacy of the forms of evidence submitted to be judged. The findings contribute to the literature on teachers' conceptions of teaching (Prosser et al 1994), teachers' conceptions of excellent teaching (Parpala, 2005) and award winning teachers' conceptions of teaching (Dunkin and Precians, 1992) by describing

variation in conceptions of excellence in teaching held by those who judge teaching excellence for teaching awards.

A simple model of SMS-based learning objects in the context of e-learning environments
Yiannis Laouris, Cyprus Neuroscience & Technology Institute, *Cyprus*
Nikleia Eteokleous, Cyprus Neuroscience & Technology Institute, *Cyprus*

The paper reports the implementation of a mobile learning environment based on short messages (SMS) interventions. The authors used a simple implementation of a Learning Object to deliver an orchestrated sequence of SMS-based learning support, in parallel to an on-going e-learning course. Each LO consisted of four elements that relate to content: (1) Short Tutorials; (2) Key Terms; (3) Flash card statements; (4) Quizzes. Although each LO is basically treated as one entity, its constituent elements were used asynchronously to "construct" short messages which were sent to the participants' mobile phones as SMS six times a day. The experiments were performed on forty college students enrolled for a business course, controlled for GPA, gender and computer and mobile phone literacy.

Presentation modality and working memory capacity
Roland Brünken, Saarland University, *Germany*
Tina Seufert, Saarland University, *Germany*

Within the frame of Cognitive Load Theory (CLT), one of the best investigated effects of instructional design is the modality effect, which refers to the advantage of audiovisual compared to visual only presentation of textual and pictorial information. Usually this effect is explained by the lower amount of extraneous cognitive load imposed by the audiovisual presentation, which leads to more available resources for knowledge acquisition. Given this, the modality effect should be related to the total amount of working memory capacity which varies between individuals. In two 2x2 experimental aptitude-treatment-interaction studies we investigated in the assumed interaction between working memory capacity (high vs. low) and presentation modality (visual vs. audiovisual) on knowledge acquisition and perceived cognitive load. Both studies revealed interaction effects on both learning and cognitive load, indicating that the modality effect indeed is a capacity effect as proposed by CLT.

Experts' networks of cognition
Tuire Palonen, University of Turku, *Finland*
Hans Gruber, University of Regensburg, *Germany*
Monika Rehrl, University of Regensburg, *Germany*
Erno Lehtinen, University of Turku, *Finland*

Introduction. The study purports to identify a pathway on how to integrate individual development and social interactions during the acquisition and maintenance of expertise. The study includes the analysis of social and personal networks, the expert context, and analyses of individual attributes. The previous network studies have indicated the importance of cohesive network positions, mediator and boundary crossing roles, the relationship between informal and formal power positions, personal characteristics and their connection with a person's network position, and the different role of strong and weak network ties in knowledge mediation. Method. Two sub studies are reported. In Sub Study 1 there are 89 participants coming from one public organization. In Sub Study 2 there are 20 participants coming from a private organization on a human resource area. As a part of the both studies, a questionnaire has been distributed and social network analysis has

been used to analyse the structure of interaction in inter organizational context. The second part of data consists of 20 interviews which have been collected among Study 2 participants. Results: Sub studies indicate that the information flow in which the workers were embedded varied enormously inside the organisation, regarding volume, quality, topics, and the richness of the information they were receiving. According to our interpretations it is not so important how voluminous a set of relationships is but rather from whom the information is received. Contribution: In addition, than only report the results from these empirical cases, our aim was to approach the target by combining several methodological tools in order to obtain an analysing unit by which it is possible to integrate individual level data into community level data.

Using dynamic visualization with written explanation to by-pass information processing deficits of children with reading difficulties
Tatjana Taraszow, Knowledge Media Research Center, *Germany*
Julia Wahl, Knowledge Media Research Center, *Germany*
Yiannis Laouris, Cyprus Neuroscience & Technology Institute, *Cyprus*
Katharina Scheiter, University of Tübingen, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*

The study investigated how multimedia messages (i.e., dynamic visualizations accompanied by written or spoken verbal explanations) can be used to support children with special educational needs in knowledge acquisition. Particularly, we were interested in whether multimedia messages may help to compensate for knowledge deficits of students with reading disabilities by providing them with alternative ways of accessing the to-be learned information thereby bypassing their reading difficulties (e.g., by presenting dynamic visualizations and / or spoken text). Against the background of current theories of multimedia learning (e.g., Mayer, 2001), it was tested whether multimedia design principles that have been established for learners with regular abilities (i.e., the multimedia principle, the modality principle, and the redundancy principle) would hold for students with reading disabilities. For experimentation, a multimedia learning environment was developed that taught elementary school children principles of animals' hibernation. As a first independent variable, it was varied whether the environment contained dynamic visualizations or not. The visualizations depicted the behavior of eight vertebrates during the seasons and their different adaptation strategies. As the second independent variable, we compared two presentation modes for verbal explanations as well as their combination: The verbal explanations were presented either as visual or auditory text, or as a combination of both. One hundred-fifty elementary students with little prior knowledge in the domain were randomly assigned to the six conditions in order to study the process of hibernation during their regular school hours. Their reading abilities assessed prior to the experiment served as a variable to distinguish groups of learners with either poor or good abilities. Learning outcomes were measured by comparing learners' scores in a multiple-choice questionnaire before and after the educational session. The study is currently being conducted in fifteen schools in Cyprus and the final results will be presented at the EARLI conference.

Profile of associate teachers: their use of ICT to develop learning
Vincent Grenon, University of Sherbrooke, *Canada*
Francois Larose, University of Sherbrooke, *Canada*

This paper presents the results of a study with a twofold purpose: (1) to gather data to draw up a general profile of the real practices of teachers concerning their use of information and communication technologies (ICT); (2) to circumscribe their level of preparation to foster learning

by means of these technologies. A survey was conducted with a stratified sample of 8000 inservice teachers in preschool and in the elementary and high schools of Quebec. A total of 1180 questionnaires were completed and returned for analysis. In this communication, we are focusing on the results obtained from a subsample of 298 associate teachers. As illustrated in table 1, associate teachers are more inclined to propose certain types of activities than others. Table 1 Types of ICT classroom activities proposed to pupils Types of ICT classroom activities % of use Word processing 68.2 Web search 33.6 Drill software 32.6 PowerPoint presentation 23.5 Games 21.4 Email 17.8 Webquest 6.0 Web page editor 6.0 Discussion forums 4.0 When asked how they portray themselves to effectively support their pupils in the use of ICT, 31.7% of them (N=99) indicated that they are capable of doing so on a regular basis. The others did not feel that they had the capacity to support their pupils effectively. The profile that emerge from this study reveals that the types of activities presented are not of a nature to optimize the full potential offered by these technologies – this observation is similar to the one advanced by the Nordic Ministries of Education (2006). The results presented also allow the Ministry of Education to better target interventions that support associate teachers in their use of ICT to foster learning in their pupils.

Development of teachers' ICT competence by team based, on-line, long term in-service teacher training: Focus on the role of the on-line LMS/LCMS system
Balázs Pethő, Eötvös Lorand University, *Hungary*

The European Pedagogical ICT License (EPICT, see www.epict.org) aims at improving teachers' ICT competence and their array of methodological tools in a task and team-based on-line learning environment. The Eötvös University has translated the EPICT in-service teacher training into Hungarian. The feasibility study of the course was carried out on a 120-person sample in 2005-2006, and the training became nationally available as an accredited in-service teacher training from October 2006. In the course of the feasibility study, we examined the personality of the participants, their ICT attitude, access, competence and their pedagogical strategies with the help of different measuring tools. Some of these tools are integrated into the EPICT's LMS, which produces a detailed log file, registering all the activities of the users. In this way, the activities carried out in an on-line environment are converted into quantity indicators, and patterns can be identified in them. The use of the LMS can be analyzed with respect to the ICT competence development, the variables of the personality profile or the pedagogical methods using ICT tools in practice on both individual and group level. In my presentation, I will show the typical patterns and customs that can be distinguished in the practical use of LMS for educational purposes. I will analyze the work of the teachers carried out in a virtual space. With the help of the data, we can get a general idea of the extent to which the indicators that can be deduced from the use of the LMS determine the success of the group or of the individual and how they are related to the attitude of teachers toward ICT tools, knowledge or their personality traits. At the conference, I will also present the results of the first non-pilot academic year, 2006-2007.

Understanding reflection in practical dance classes
Ali Leijen, Utrecht University, IVLOS, *Netherlands*
Ineke Lam, Utrecht University, IVLOS, *Netherlands*
Liesbeth Wildschut, Utrecht University, Inst Media and Re/presentation, *Netherlands*
P. Robert-Jan Simons, Utrecht University, IVLOS, *Netherlands*

In our previous study we found that supporting students' reflection process can be considered as a widespread educational need of practical dance classes. Before we can elaborate on facilitation, we need to answer the following research questions: what is the aim, focus, and process of the desired

situation concerning students' reflection in practical dance classes? Which problems are students currently experiencing according to teachers in the reflection process? The current paper focuses on answering these research questions based on the data collected from 14 dance teachers in the Netherlands and discusses how using an ICT application could facilitate students' reflection on their learning.

KN1 1
29 August 2007 12:30 - 13:30
Room: Gömb Aula
Invited Paper

Neuroscience in education: The challenges of transdisciplinarity

Valéria Csépe, Eötvös Loránd University, *Hungary*

Chair: **Elsbeth Stern,** ETH Zurich, *Switzerland*

The recent years of brain research have seen the emergence of a new synthesis between two different disciplines, neuroscience and education. Recent results suggest that a solid knowledge of factors influencing the brain's maturation- and development-related changes may help to construct optimal learning conditions. It is well known that many different factors may contribute to the brain's state and receptivity to learning. First, there are special periods in brain development, called sensitive periods, when the brain is capable of undergoing functionally significant changes to a degree that cannot be attained after the periods' closure. Second, physical, emotional as well as social health has significant influence on the brain's learning capacity and sensitivity. Third, successful acquisition of the cultural techniques, such as literacy and numeracy, depends on very complex adaptive changes of the human brain that is not developed for this purpose during the Homo sapiens's evolution. The presentation will highlight recent results of the cognitive neuroscience providing a deeper insight into brain changes accompanying lifelong learning. First, recent data on a sequential development of different cortical areas and networks underlying plasticity, one of the fundamental brain mechanisms of learning, will be presented. Second, recent data on changes undergoing in the school-age children's brain becoming literate, acquiring mathematics and becoming literate in music will be shown in detail. Third, significant brain changes occurring in adolescence will also be presented in order to draw attention to this period highly important in the curriculum. It seems that cognitive neuroscience has already transcended the borders between disciplines and a new collaboration has started between neuroscientists and educators. A cautious interpretation of our newest knowledge on changes in the learning brain as well as the avoidance of misconceptions arising from ill-interpreted data of neuroscience in education could and should inseminate educational practice and policy.

KN1 2
29 August 2007 12:30 - 13:30
Room: Konferencia
Invited Paper

Exploratory orientation: Motivation and identity processes in the service of learning and development

Avi Kaplan, Ben-Gurion University of the Negev, *Israel*

Chair: **Anastasia Efklides,** Aristotle University of Thessaloniki, *Greece*

Exploration, or the "active search for information, its examination, and evaluation in a self-reflective manner" (Flum & Kaplan, 2006, p. 100), has been underscored by several psychological literatures as a fundamental process which underlies adaptive learning and development. For example, the literatures concerned with adaptive attachment processes, identity formation, and career development all point to exploration as an essential process in growth, achievement, and well-being. In this address, I will present the notion of "exploratory orientation" as an important and desired educational goal (see Flum & Kaplan, 2006). We define exploratory orientation as the engagement in activities with the purpose of relating experiences to the self. I will describe the psychological processes that are involved in and which characterize exploratory orientation, and describe the advantages of exploratory orientation in the education of youth in contemporary societies. I will then point to the overlap, but also to the contribution, of exploratory orientation over and beyond other important concepts associated with adaptive engagement including mastery goals orientation, self-determination, interest, and self-regulated learning. I will argue that exploratory orientation goes beyond "positive" psychological concepts to encompass "constructive tension"—the facilitation of a constructive balance between positive and negative experiences—as a central adaptive mechanism for engagement in action and development of the self. Finally, I will draw on socio-cultural perspectives and meaning-making processes in order to highlight some principles for facilitating exploratory orientation in school settings.

KN1 3
29 August 2007 12:30 - 13:30
Room: Harmónia
Invited Paper

Painful Learning and learning for hope: On the difference between teachers work for moral growth and for religious/spiritual change

Fritz K. Oser, University of Fribourg, *Switzerland*

Chair: **Pietro Boscolo,** University of Padova, *Italy*

I will address moral development in context, and religious and spiritual growth with respect to acting in situations. One phenomenon concerns the "unhappy moralist effect." Persons that have to decide between being moral or successful, feel unhappy if they choose morality as a steering power. Consider a negotiation in which instead of slightly cheating and thereby receiving more money, someone chooses to be moral, feels bad afterwards, and thinks he/she doesn't have enough self-efficacy to manage life. Another effect, from comparing three generations (grand-parents, parents and grand-children), is that the grand-children's responsibility for moral and religious virtues is mostly either value-lower or higher than the other two generations. The statement "I do not like to share with others" on a Lickert four-point-scale was weighted higher by grand-children. In contrast, children value virtue justice lower than other generations. Additionally, all three generations weight the spiritual behavior as very important, whereas grandparents show a higher estimation towards religious judgment and religious belief. Strong moral or social norms that protect children and adolescents (like not taking drugs) are mostly rated very high. Finally, studies on the correlation between moral mistakes/moral transgressions and religious mistakes or religious judgment indicate that intervention programs show a conceptual change with respect to exclusion, xenophobia and rightwing orientation. One unexpected result is that students who are insecure with their attitude towards strangers and immigrants grow toward more integrative behavior. But students who are right-wing at the beginning are even more right-wing oriented after the intervention. They use or misuse the argumentation of integrative tendencies for their own counter-arguments. How can we scientifically, strategically and diagnostically deal with this phenomenon? Finally, I will show the necessity to combine vertical stage-oriented growth with horizontal change. Intervention studies are only successful in this combination with respect to moral and religious/spiritual learning.

E 1
29 August 2007 14:30 - 16:30
Room: 0.87 Marx
SIG Invited Symposium

Recent developments in the design of computer supported inquiry learning environments

Chair: **Zacharias Zacharia,** University of Cyprus, *Cyprus*
Organiser: **Zacharias Zacharia,** University of Cyprus, *Cyprus*
Organiser: **Ton de Jong,** University of Twente, *Netherlands*
Discussant: **Roxana Moreno,** University of New Mexico, *USA*

Inquiry based learning has attracted a lot of attention by researchers who have studied learning especially in the disciplines of Mathematics and Science. This interest has now begun to spread into teaching and learning in other disciplines such as History, Social Studies, and Psychology. One of the outcomes of this interest has been an intensive research activity in the various aspects of the design of computer based learning environments that offer support for inquiry. Specifically, active research has concentrated for many years on how technology can be used to create and enhance learning environments that aid students in the processes of formulating investigations intended to create new knowledge and understanding. The different mechanisms for facilitation, monitoring and assessment of inquiry oriented learning have focused the efforts of many research activities that aim to bridge educational theory and teaching practice. In this symposium, we aim to highlight some of the recent research results that have emerged out of studies that examine these various aspects of teaching and learning through the use of online inquiry based learning environments that encompass modelling and simulation tools.

Design principles of the support system for a web-based inquiry learning environment
Margus Pedaste, University of Tartu, *Estonia*
Tago Sarapuu, University of Tartu, *Estonia*

A web-based learning environment "Young Scientist" (http://bio.edu.ee/noor/) was composed for developing students' problem-solving and inquiry skills. This environment was applied in a pilot study (n=60) for finding the factors limiting learners' outcomes in acquiring inquiry skills related to both transformative and regulative inquiry learning stages. These factors have been used for designing adapted support system for different clusters of learners. Two main research questions have been formulated: i) Which transformative inquiry skills can be developed in web-based inquiry learning environment? ii) How does an adapted support system that improves learners' regulative inquiry skills influence on students' transformative inquiry skills. A questionnaire for evaluating these skills was worked out and filled in by students before and after using this environment. The inquiry learning tasks and appropriate additional materials were composed for learning science processes in the 6th grade. The students were categorised with cluster analysis and appropriate adapted support system was developed for all clusters. The system was designed on the basis of learners' regulative inquiry skills, and the characteristics of learning tasks and environment. This article gives an overview of the design principles of this web-based support system for the learning environment "Young scientist". However, these findings can be generalised for applying in various analogous web-based learning environments. Our results demonstrated that the effectiveness of inquiry learning is strongly influenced by the adapted

regulative support. Five main clusters of students that have to be provided with different support have been found. These results are important in highlighting the computer-supported inquiry process. Moreover, they are also applicable for developing science curricula and other learning materials for learning science. The validated questionnaire of transformative inquiry skills is usable in analogous research projects.

Enacting things differently: Using NetLogo models to learn about complex systems
Cindy Hmelo-Silver, Rutgers University, *USA*
Lei Liu, Rutgers University, *USA*
Heather Finkelstein, Rutgers University, *USA*
Russell Schwartz, Rutgers University, *USA*

The RepTools project seeks to embed conceptual representations in curriculum and computer simulations to promote inquiry-based learning and deep science understanding. We focus students' inquiry on structure-behavior-function relationships to help them make connections among different levels of complex systems, such as the relation between form and function. Students used various artifacts, such as hypermedia materials, physical models, and NetLogo computer models, to construct an understanding of aquarium ecosystems. We conducted our studies in two different classroom settings. Both settings had a physical aquarium in the classroom and test kits to study the aquarium environment. The students had access to a function-oriented hypermedia for background information and reference prior to engaging in computer-supported inquiry. The NetLogo simulations presented two models of aquaria at different scales. The Fishspawn simulation was at a macro level that allowed learners to examine the conditions under which fish will reproduce and survive. The Nitrogencycle simulation was at a micro level that allowed students to examine the bacterial–chemical interactions that are critical for maintaining good water quality. Pre- and post-tests were conducted to assess learning outcomes. The student interactions were videotaped to examine the learning processes. The learning outcomes showed significant pre-test to post-test gains in both classrooms. However, the enactments were extraordinarily different because of the different teaching styles and different levels of comfort with inquiry. One teacher set this up as a project-based classroom, with a driving question- how to strike a balance in a aquatic ecosystem - to guide the unit, whereas the other focused on having students understand the food web in the aquarium. The first teacher ran a very student-centered classroom and the other was teacher-centered. We present a contrasting case analysis to examine how the teacher's interaction style and inquiry orientation influenced the kinds of interactions that occurred.

The potential of a digital learning game in supporting inquiry learning about swamp ecosystems
Tiina Nevanpaa, University of Jyväskylä, *Finland*

This study examines the role of interactive learning game in supporting the knowledge construction concerning swamp ecology. Recognition and understanding of different ecosystems is integral part of science education. However, pupils' knowledge of ecosystems and ecological principles are often lacking or inaccurate. Furthermore, pupils' pre-instructional conceptions are persistent and difficult to elaborate with the help of traditional instruction. Gaming is a commonplace activity of young people. Game play and interactivity is found to be interesting and motivating also in educational purposes. Possibility to study and investigate scientific phenomena in situations that models the environment gives the pupils opportunities to elaborate their conceptions for scientific phenomena. In this study two age group of students, aged 15 (n=50) to 20 (n=50), used a digital learning game for studying principles of swamp ecosystem. The learning game is developed at the University of Jyväskylä, Agora Game Laboratory and is called "Swamp

Adventure". It is an adventure type role play in which the learner is able to examine and study basic principles of swamps. Before playing the game pupils answered a questionnaire in which their knowledge and ideas of swamp ecosystems were examined. They also wrote an essay concerning the theme. After game play pupils were able to make changes in their original essays and answered the questionnaire again. Control groups were not used because of the descriptive nature of the study. The empirical data consisted of written answers that were analysed qualitatively using a theory-bound content analysis method. The data from the questionnaire was analysed quantitatively. On the basis of preliminary results the learning game is a promising tool in fostering conceptual understanding of swamp ecology in both age groups.

Fostering higher order thinking skills via a computer-supported inquiry-based chemistry laboratory
Yehudit Dori, Technion, Israel Institute of Technology, *Israel*

The case-based computerized laboratory (CCL) environment, developed at the Technion, is a chemistry study unit designed for 11th-12th honor students. The CCL unit is an inquiry-based unit that integrates computerized desktop experiments and computerized molecular modeling. Emphasizing scientific inquiry and case studies, the environment exposes students to advanced laboratory methods and a variety of data and molecular representations. Students are required to critically read authentic problems, carry out laboratory experiments, process data collected by sensors, and interpret the resulting displayed graphs and/or molecular models. This learning environment aims to foster students' higher order thinking skills. Throughout the course, the students compiled portfolios that were continuously assessed. Upon completing the unit, groups of 2-3 students carried out an independent inquiry (PBS-type) project, in which they raised an inquiry question in chemistry, formulated a hypothesis, designed and conducted a sensor-based experiment, analyzed results, and drew conclusions relating to their hypothesis. The goal of our research was to investigate students' question posing, inquiry, graphing, and modeling skills. The research population consisted of about 600 12th grade honors-level chemistry students. Research tools included pre and post case-based tests and students' reflections. The CCL students' learning outcomes were compared to those of about 100 12th grade honors-level chemistry students who studied in non-computerized learning environments. We found significant improvement in students' performance in all the thinking skills in the posttest compared with the pretest, with higher and significant net gains of the experimental students vs. their control peers. We also found that graphic and modeling representations contributed to chemical understanding of the CCL students by giving explanations at an increased subset of the four levels: symbol, macroscopic, microscopic and process. Our research findings emphasize the contribution of a computer-supported inquiry-based learning environment to closing the gap between data gathered in chemical experiments and chemistry understanding.

Computer tools to support medical problem solving
Susanne Lajoie, McGill University, *Canada*
Genevieve Gauthier, McGill University, *Canada*
Solange Richard, McGill University, *Canada*

The case-based computerized laboratory (CCL) environment, developed at the Technion, is a chemistry study unit designed for 11th-12th honor students. The CCL unit is an inquiry-based unit that integrates computerized desktop experiments and computerized molecular modeling. Emphasizing scientific inquiry and case studies, the environment exposes students to advanced laboratory methods and a variety of data and molecular representations. Students are required to

critically read authentic problems, carry out laboratory experiments, process data collected by sensors, and interpret the resulting displayed graphs and/or molecular models. This learning environment aims to foster students' higher order thinking skills. Throughout the course, the students compiled portfolios that were continuously assessed. Upon completing the unit, groups of 2-3 students carried out an independent inquiry (PBS-type) project, in which they raised an inquiry question in chemistry, formulated a hypothesis, designed and conducted a sensor-based experiment, analyzed results, and drew conclusions relating to their hypothesis. The goal of our research was to investigate students' question posing, inquiry, graphing, and modeling skills. The research population consisted of about 600 12th grade honors-level chemistry students. Research tools included pre and post case-based tests and students' reflections. The CCL students' learning outcomes were compared to those of about 100 12th grade honors-level chemistry students who studied in non-computerized learning environments. We found significant improvement in students' performance in all the thinking skills in the posttest compared with the pretest, with higher and significant net gains of the experimental students vs. their control peers. We also found that graphic and modeling representations contributed to chemical understanding of the CCL students by giving explanations at an increased subset of the four levels: symbol, macroscopic, microscopic and process. Our research findings emphasize the contribution of a computer-supported inquiry-based learning environment to closing the gap between data gathered in chemical experiments and chemistry understanding.

E 2
29 August 2007 14:30 - 16:30
Room: -1.62
SIG Invited Symposium

Getting involved: Moral and democratic education

Chair: **Wiel Veugelers,** University of Amsterdam, *Netherlands*
Organiser: **Wiel Veugelers,** University of Amsterdam, *Netherlands*
Organiser: **Fritz Oser,** University of Fribourg, *Switzerland*
Discussant: **Fritz Oser,** University of Fribourg, *Switzerland*

Many countries are strengthening their citizenship education. In citizenship development human development has to balance between a national orientation and a more global cosmopolitain orientation. In educational policy and in educational practice people are struggling to realize a kind of citizenship education that helps youngsters to participate in a global world. In citizenship education students are supported in their identity development. The affective processes are important. It's not only about learning knowledge or skills, but about getting involved in social, moral and political practices. Teachers guide and counsel students in a socio-constructive way in this development. In this invited symposium 5 research projects from different part of the Western world will be presented.

Intercultural awareness among students in German-Italian schools
Vera Husfeld, University of Applied Science, Northwest Switzerla, *Switzerland*

Apart from learning a second language one of the most important aims of bilingual schools is the development of intercultural competence. Cultural awareness, e.g. openness towards other

cultures, awareness about stereotypes on the own and the other culture etc., is part of it. A survey at the German-Italian comprehensive school in Wolfsburg (Germany) conducted in 2005 as a pilot study gives some insights in the acceptance, openness, and tolerance of adolescents in a bilingual school, as well as about their cultural stereotypes. A comparison of data from this study with data from Italian and German students from the sample of the IEA-Civic-Education-Study shows a significantly higher positive attitude towards immigrants among students from the bilingual school. Students whose parents both speak Italian at home have much more positive stereotypes on their own culture then the German speaking students. Whether this is a matter of the school concept in Wolfsburg or a general attitude of students with immigrant status will be analyzed in the main study, which will include different German-Italian schools in Germany, Switzerland and Italy as well as monolingual comparative schools.

Citizenship education in Finnish schools: Educating local or global citizens?
Kirsi Tirri, University of Helsinki, *Finland*

The Finnish young people are living in a society in which education is highly valued. In spite of a good educational system, Finland has urban schools in which the problems of equality and diversity challenge the educators to pay special attention to citizenship education that promotes not only local but also global citizenship. Osler and Starkey (2005) identify cosmopolitan citizenship informed by human rights as a goal of citizenship education. This kind of citizenship is a worldview that celebrates human diversity. Cosmopolitan citizens act locally, nationally and globally. They accept shared responsibility for humanity's common future. The education of global citizens must start at the level of the local community and extend outward. The data has been gathered from 4 urban schools in two different cities in Finland. Two of the schools are elementary schools and two are secondary schools. The schools have been selected based on their good results in educating diverse populations with multiple challenges. All the principals are respected leaders in their own communities. We have interviewed the principals of the schools (two males and two females), and some key informants from their schools. These informants include two teachers, two parents, and two students from each school. In addition to qualitative data, we have gathered quantitative data from teachers (N=84) and students (N=429) of the schools. The quantitative surveys have measured cultural, spiritual and ethical sensitivity of the students and teachers. The case studies from each school are analyzed using a hermeneutical approach (Gadamer 1976) to better understand the multifocal perspectives in them. A special interest in our data will be shown to the different ways principals, teachers, parents and students refer to local or global citizenships in their school edcation.

The contribution of media literacy to the system of perceptions, attitudes and civil-democratic behaviors among adolescents
Nava Maslovaty, Bar-Ilan University, *Israel*
Dorit Alt, Bar-Ilan University, *Israel*
Arie Cohen, Bar-Ilan University, *Israel*

The aim of the research was to examine the relationship between studying in a high school media literacy (Communication) study track in Israel, and the system of civic-democratic perceptions, attitudes and behaviors of adolescents. The school serves as a socialization agent in developing media literacy skills that are vital for democratic citizenship in the information age through critical pedagogy. The sample included 262 students in four public high schools. Students in the Communication track comprised the experimental group and students in the Social Sciences and Exact Sciences tracks comprised the control group. A closed questionnaire that examines civic-

democratic perceptions, attitudes and participation among adolescents (Ichilov, 2000; Torney-Purta et al., 2001) was administered to all students. Six teachers of Communication participated in the study. They were examined by a Qualitative research tools included interviews, and observations of theoretical and practical lessons. Findings: 1.Communication students were found to perceive the classroom climate as open for discussing political issues more than the control group. 2.Communication students' perception of the curriculum as advancing democratic values was statistically significantly higher than the perception of students in the other study tracks. 3.Communication students participated significantly more in voluntary organizations than students in the other tracks. 4.A relationship was found between teaching methods implemented in the classroom and school involvement indices. Discussion: The study corroborated the research assumption that the Communication track makes a positive contribution to democratic involvement in school, and this contributes to increased political involvement. The media literacy was found as a crucial skill for democracy life, emphasizing the contribution of the relationship between critical pedagogy and citizenship orientation among adolescents (Ten Dam & Volman, 2004).

The antecedents of civic engagement; school and community experience
Helen Haste, University of Bath / Harvard University, *United Kingdom*

In a study of over 1000 British young people we found that certain aspects of democratic classroom climate were associated with current and intended future action in the civic domain and with beliefs about citizenship. We also found that experience in the community, and the perceived quality of life in the community of origin, predicted action and values. Strong outcomes of having been engaged in recent action included increased confidence, a desire to do more of the same kind of thing, and also a change in personal values. The educational implications of these findings are discussed.

Creating critical-democratic citizenship education
Wiel Veugelers, University of Amsterdam, *Netherlands*

As of 2006, Dutch schools are formally obliged to work on citizenship education. Educational legislation and regulations state that schools should develop 'active citizenship and social integration'. The Minister of Education is aware of the fact that schools do already work on citizenship development in their curriculum and in their school culture. The new initiative attempts to support this work and to stimulate more being done in schools on citizenship development and in a more coherent framework. This paper first examines developments in Dutch education, and draws on the results of various empirical studies we have conducted. We then set out our own particular critical pedagogical view on citizenship education. The outline of the paper is: Different concepts of citizenship and changes in Dutch education · Changes in educational discourse on values and norms · Developing a critical-democratic pedagogy · Individualization in modern society · Social awareness and democracy · Empowering humanity · Moral education, critical pedagogy and democratic education Critical issues in Dutch citizenship education · Difference between development of values and norms · Citizenship education in Dutch state schools · The school as a community · The multicultural society and values and norms in education · Critical-democratic citizenship in education

E 3
29 August 2007 14:30 - 16:30
Room: 0.89 Jedlik
SIG Invited Symposium

Understanding the influence of individual variables and teaching approaches on how students in HE

Chair: **Keith Trigwell,** University Sydney, *Australia*
Organiser: **Keith Trigwell,** University Sydney, *Australia*
Organiser: **Mien Segers,** University Leiden, *Netherlands*
Discussant: **Keith Trigwell,** University Sydney, *Australia*

For many students the transition from secondary school to university brings many challenges both academic and non-academic. In respect of the former, students often experience new ways and environments of learning. Moreover, they face expectations of their own approaches to study and are expected to gradually work within the ways of thinking and practising (WTP) of the subject area. Students bring with them into tertiary study attitudes about the discipline, beliefs about learning and preferences for approaches to learning. During their university study, approaches to learning might evolve because of the learning environment they experience. The main goal of this symposium is to gain insight in how freshman approach their learning, the influence of individual variables during their university career and the impact of teaching approaches. The studies of Sainsbury, Smith & Krass, Nijhuis & Segers and Mc Cune address the influence of individual variables on learning approaches. Sainsbury et al. investigated students' preferred learning approaches during their university study, the relation with academic performance, and the influence of gender and domain of learning. Nijhuis & Segers focus on the interplay of students' attitude to the course, perceptions of the learning environment and learning strategies. The McCune study explores students' approaches to learning as the willingness to engage actively or to work within the ways of thinking and practising of the subject area to. The study aims to identify the main themes in the final year biosciences students' accounts of what influenced their enthusiasm for their studies and their willingness to engage actively with the subject matter. The Zoller study aims to explore how students can be supported in the development of specific approaches to learning, referred to as higher-order cognitive skills (HOCS) via the tandem implementation of appropriate 'HOCS promoting' teaching strategies and HOCS-level assessment.

How do they like to learn? Investigating approaches to learning in an Australian university student cohort
Erica Sainsbury, University of Sydney, *Australia*
Lorraine Smith, University of Sydney, *Australia*
Ines Krass, University of Sydney, *Australia*

Commencing university is a major milestone for Australian secondary school graduates, and it brings many challenges both academic and non-academic. In respect of the former, students often experience new ways and environments of learning, and face expectations of their own approaches to study and regulation which differ substantially from those of their previous education. Commonly, students are exposed to greater volumes of material and are expected to learn at a faster pace, as well as to engage in self-regulation and take personal responsibility for their learning. Students bring with them into tertiary study beliefs, attitudes, motivations and strategies

which have evolved throughout their schooldays and these may or may not be likely to facilitate learning in the tertiary environment. We investigated the learning approaches preferred by students enrolled in a four year undergraduate pharmacy degree at the University of Sydney using Vermunt's Inventory of Learning Styles (Vermunt, 1998) using a cross-sectional repeated measures design. In addition we investigated the relationship between approaches to learning and academic performance, and the influence of gender and domain of learning. We found a strong preference for application directed approaches in all four years, and a significant positive relationship between this orientation and academic performance. Pharmacy students thus demonstrated a strong vocational orientation to learning and a belief that learning comprises the use of knowledge, rather than intake of knowledge or constructing knowledge. However we also found poor levels of self-regulation, ambivalence regarding learning orientations, and dependence upon external sources of help, together with lower preferences for deep processing strategies. These findings are consistent with the observations of pharmacy academics and clinicians that many students tended to adopt surface learning approaches and were reluctant to engage in self-directed and reflective practices.

The interplay of attitude to the course, perceptions of the learning environment and learning strategies: a study amongst International Business students.
Jan Nijhuis, university Maastricht, *Netherlands*
Mien Segers, University Leiden, *Netherlands*

Previous research on student learning has examined the relationships between the perceptions of the learning environment and learning strategies. However, learner related characteristics are also relevant. In this respect the attitude to the discipline in terms of, affection, cognitive competence, value and difficulty could be a relevant variable in explaining students' learning strategies. To date the influence of this factor on both students' perceptions and their learning strategies has received little attention. This study will focus on the joint relationships between students' attitude to the discipline, their perceptions of the learning environment, and the learning strategies they used. The study was conducted in an International Business program, with 350 students participating in the research project. Three questionnaires were administered; an adapted version of the Survey of Attitudes Towards Statistics (now focussed on the discipline Strategy) (Gal, Schau, Ginsburg, 1997), the Course Experiences Questionnaire measuring the perception of the learning environment (Ramsden, 1997) and Study Process Questionnaire for measuring learning strategies (Biggs, 1987). Linear regression was conducted to assess the nature of the relationships between attitude to the discipline, perceptions of the learning environment, and learning strategies. Both attitude to the discipline and perceptions of the learning environment are related to learning strategies. Multiple regression analysis revealed that only a limited number of variables are related to learning strategies.

Final year biosciences students' willingness to engage: teaching-learning environments, authentic learning experiences and identities
Velda McCune, University Edinburgh, *United Kingdom*

This paper focuses on investigating what underpins experienced biosciences students' willingness to engage actively with their studies. In the context of this analysis, active engagement is seen as being situated within specific disciplinary contexts and communities. Thus active engagement implies students working within the ways of thinking and practising (WTP) of the subject area. The interview transcripts which form the basis of this analysis are a subset of the data from the Enhancing Teaching-Learning Environments in Undergraduate Courses (ETL) Project, a large-

scale project which was funded from 2001-2005 by the UK Economic and Social Research Council. The data set used in this paper comprises transcripts from 19 semi-structured group interviews with 59 students from 3 contrasting types of university in the UK. A rigorous thematic analysis of the data, using HyperRESEARCH (version 2.6.1 from Researchware, Inc.), resulted in a multi-faceted conceptual model of the influences on the students' willingness to engage. This model describes the interplay between aspects of students' identities and facets of their learning contexts in university and on work placement. The analysis suggests that no single influence can explain the extent of the students' engagement but, for some students, identification with the role of 'scientist' seemed particularly important. The notion of 'authentic learning experiences' is used to draw together the students' perspectives on how key learning experiences influenced their identity development and willingness to engage with their studies.

Enhancing deep learning via higher-order cognitive skils (HOCS)-promoting teaching strategies and assessment

Uri Zoller, University of Haifa-Oranim, *Israel*

Given the current striving for sustainability and the corresponding paradigms shift in science, technology, R&D, environment perception, economy and politics; e.g., from unlimited growth-to-sustainable development, correction-to-prevention and passive consumption of "goods", culture and education-to-active participation, all in the science-technology-environment-society-economy-policy (S-T-E-S-E-P) context, the corresponding paradigms shift in higher education is unavoidable. This means a shift from the currently dominating lower-order cognitive skills (LOCS) algorithmic teaching, to HOCS-promoting deep learning, typified by students' evaluative thinking and transfer capabilities. Our active research in STESEP-oriented science teaching in higher education, was targeted at the development of students' HOCS such as critical thinking, question asking, and problem solving, within 'traditional' science courses. Within a pre-post research design, our intervention focused on the implementation, in science courses, of non-traditional teaching strategies and HOCS' level examinations (containing HOCS- and HOCS/LOCS-requiring questions), selected representative examples of which will be presented and critically discussed. The main findings of our research, in the context of higher education chemistry/science instruction, are: (a) the HOCS capabilities of question asking and critical thinking-problem solving, are enhanced (pre-post gains) via the tandem implementation of appropriate 'HOCS promoting' teaching strategies and HOCS-level assessment; (b) HOCS enhancement requires time; it is not achievable via a single-shot short exercise; and (c) assessment needs not only be consistent with the instructional objectives, but also capable of their promotion in order to achieve them. The educational significance and implications are: (1) Deep learning through HOCS-level assessment is attainable, suggesting (2) HOCS development is contextually-not discipline content-bound. Thus, HOCS enhancement not only can be done; it should be done, across the board, in higher education.

E 4
29 August 2007 14:30 - 16:30
Room: -1.64
Symposium

Metacognition and mathematics: challenges and potentials

Chair: **Annemie Desoete,** Ghent University & Arteveldehogeschool, *Belgium*
Organiser: **Annemie Desoete,** Ghent University & Arteveldehogeschool, *Belgium*
Discussant: **Henk Vos,** University Twente, *Netherlands*

Proficient students are assumed to select appropriate strategies and adjust behavior to changing task demands, making use of the awareness of previously knowledge and selecting appropriate study behavior. Metacognition was found to be instrumental in challenging tasks in mathematics, not overtaxing the capacity and skills of children and in relatively new strategies that are being acquired.This symposium focuses on the challenges and potentials of metacognition in mathematics. In a first presentation Marja Vauras analyses developmental interactions of word problem solving, metacognitive knowledge and metacognitive experiences in elementary school students as a function of gender, taks difficulty and mathematical proficiency. In the next presentation Veenman elaborates on the role of metacognitive skills in different types of learning tasks in the domain of mathematics in secondary school students. In addition Tempelaar analyses the role of self-perceived metacognitive knowledge, skills, and attitudes, in learning mathematics at a high-school level. Finally Mei-Shiu Chiu investigates in grade 5-7 students the levels of meta-cognitive knowledge in achieving deep approaches to mathematics learning:

Developmental interactions of word problem solving, metacognitive knowledge and metacognitive experiences in elementary school students as a function of gender, task difficulty and mathematical proficiency
Marja Vauras, University of Turku, *Finland*
Riitta Kinnunen, University of Turku, *Finland*
Tiina Annevirta, University of Turku, Finland, *Finland*
Anu Kajamies, University of Turku, *Finland*
Tuike Iiskala, University of Turku, *Finland*

Within a longitudinal design, we examined the associations between mathematical problem solving (MPS), metacognitive knowledge (MCK) and metacognitive experiences (ME) of elementary school students as a function of gender, task difficulty and mathematical proficiency. Although the notion of ME was introduced by Flavell in 1979, empirical studies are recent and still rare. Metacognitive experiences are feelings, estimates, and thoughts about cognition during the task, and contribute to students' self-regulation of learning. ME differ from MCK, that is, declarative knowledge regarding goals, persons, tasks, and strategies, as well as from metacognitive skills. In this presentation, we (1) offer some new evidence on interactions between ME and task performance, and (2) present results on developmental associations between MCK, ME and math problem solving. The participants were 10-year old, 4th grade students (n = 436), following the mainstream curriculum, and they we tested on math problem solving and metacognition at three time points over a one year period. A year later, we collected same data from a comparable cohort, and this cohort is used to validate outcomes. In sum, our overall findings suggest a relatively accurate calibration of judgments already at young age, and indicate context-dependent nature of ME compared to more stable MCK. Gender effects showed over-

optimism in boys and uncertainty in girls, which may have an important bearing on observed differences between later mathematical interest and proficiency. Correlations between MCK and ME were low, indicating that they capture notably different aspects of metacognition. Preliminary path analyses revealed that ME had a significant relation to MPS only within the same task context, but MCK was directly related also to later MPS. Multi-level analyses comprising the full longitudinal data will be presented at the conference, and discussed in relation to previous research evidence and educational implications.

The role of metacognitive skills in different types of learning tasks in the domain of math.
Marcel V. J. Veenman, University Amsterdam & Leiden, *Netherlands*
Henriette van Vredenburgh, Leiden University, *Netherlands*
Bernadette H. A. M. Van Hout-Wolters, University of Amsterdam, *Netherlands*

Instruction Learning Episodes (ILEPs) are different types of learning tasks, characterized by being either productive or reproductive of nature, by being either knowledge or skill based, by being metacognitive or not, and by aiming at near or far transfer. This study is an improved replication of an earlier study, and it focuses on how different ILEPs within the discipline of math differentially draw on metacognitive skills. Twenty 14-15 yrs old secondary-school students completed a series of probability-calculus tasks while thinking aloud, with each task representing a different ILEP. Metacognitive activities were assessed for each ILEP task through protocol analyses. Results show a differentiation in metacognitive activity between ILEPs.

The role of self-perceived metacognitive knowledge, skills, and attitudes, in learning mathematics
Dirk Tempelaar, Maastricht University, *Netherlands*

In this empirical study, we investigate the relationships between self-perceived effort in learning, measured effort in learning, and learning outcomes at the one side, and a range of self-report measures related to achievement motivation, implicit theories about intelligence, and metacognition, at the other side, of university students learning mathematics and statistics. The prime focuses of the study are the investigation of both the dependency of metacognitive self-perceptions on implicit theories, as well as the explanatory power of metacognition for subject specific achievement motivations, which in their turn explain effort and performance. Implicit theories are meaning systems about personal attributes as e.g. intelligence (Dweck, 2000). Prototypical examples are the concept of entity theory, that assumes intelligence to be a fixed, nonmalleable traitlike entity, and the concept of incremental theory, where intelligence is portrayed as something that can be increased through one's efforts. Students' metacognitive abilities are operationalised by the recently developed self-report instrument Awareness of Independent Learning Inventory (Elshout-Mohr et al., 2005; Tempelaar, 2006), that presumes metacognition to be a three dimensional construct, comprising knowledge, skills, and attitudes. Expectancy-value models form the basis of an instrument measuring achievement motivations and self-perceived effort (Schau et al, 1995; Tempelaar et al, 2007). Schau's expectancy-value model distinguishes two expectancy factors dealing with students' beliefs about their own ability and perceived task difficulty, a construct expressing subjective task-value, an affective task-related attitude, and the constructs interest and effort. Both achievement motivations and self-perceived effort are measured ex ante and ex post, in order to be able to observe developments during the learning episode. The relationships are investigated using structural equation modelling. Subjects in this study are 1500 first year students in an economics or business program, participating in an introductory course mathematics and statistics.

The scale of levels of meta-cognitive knowledge in achieving deep approaches to
Chiu Mei-Shiu, National Chengchi University, *Taiwan*

The study aims to develop a scale which indicates the ascending levels of meta-cognitive knowledge in achieving a deep approach to mathematics learning. The contents of meta-cognitive knowledge were obtained by interviewing 65 Grade-5 children in Taiwan for their perceptions of the meanings of mathematics and learning mathematics. The contents were grouped into 14 themes, for each of which scale items were designed. The scale, with an additional six items of deep approaches, was filled in by 667 Grades 5-7 students. A factor analysis identified six factors. Correlations between the respective six factors and the deep approach were used to determine the levels of each factor, with the largest correlation being the highest/sixth level/factor. The analysis results show that each level contains the components of motivation and strategy. The components for motivation in Levels 1-6 were low confidence, destiny, aspiration/attainment, vocation, liberty, and interest in/beauty of mathematics. The components for strategy in Levels 1-6 were anxiety, avoidance, effort, pragmatism, creation, and understanding. Levels 1-2 showed negative relationships with students' mathematics achievement, Chinese achievement, and perceptions of pleasant learning in mathematics classroom, while Levels 3-6 showed positive relationships respectively. The present findings broaden the knowledge of the interaction between motivation and strategy in meta-cognitive knowledge. It also identifies a step-by-step process in achieving a deep approach to mathematics learning, and therefore can elaborate the theories of learning approaches. Based on the understanding of students' levels of meta-cognitive knowledge in mathematics classroom, teachers can design pedagogies which not only deal with the inhibitions found in motivation and use of strategy at the lower levels, but also to cultivate the presence of the more positive motivation and strategy at the higher levels so as to achieve deep learning approaches and achievement.

E 5
29 August 2007 14:30 - 16:30
Room: 0.100D
Symposium

Self-determination in educational contexts: Are the beneficial effects universal?

Chair: **Mareike Kunter,** Max Planck Institute for Human Development Berlin, *Germany*
Organiser: **Mareike Kunter,** Max Planck Institute for Human Development Berlin, *Germany*
Organiser: **Yi-Miau Tsai,** Max Planck Institute for Human Development Berlin, *Germany*
Discussant: **Kevin Miller,** University of Michigan, *USA*

Linking features of the learning context to students' motivation is an emerging trend in education research (Volet & Järvelä, 2001). However, in order to systematize research, a sound theoretical foundation is needed. The present symposium draws on self-determination theory (Deci & Ryan, 2002) and its assumption of three basic psychological needs – autonomy, competence, and social relatedness – as fundamental motives that foster individuals' subjective well-being and motivation. Contextual features play an important role from this perspective, forming opportunities or constraints for the satisfaction of these psychological needs, which in turn supports individual development. Conceptually, all students are assumed to show higher subjective well-being and

adaptive learning behaviour in learning contexts where their basic needs are supported. However, a further layer of complexity is introduced when other individual motivational characteristics are taken into account. Motivational characteristics such as stable individual intrinsic interest, personal goals, goal orientations, and values (Pintrich, 2003) have all been found to be associated with more adaptive learning and better achievement outcomes. Do students with different motivational characteristics benefit equally from the same environmental features? This symposium discusses how features of the learning environment, features of the person, and the interplay between the two affect students' functioning. It brings together studies of contextual variables such as perceptions of teachers' supportiveness in the classroom, the framing of learning activities, and perceptions of fellow students' characteristics. Drawing on different methodological approaches such as experimental, correlational, and multilevel designs, the studies examine the effect of these contextual features on students' need satisfaction and individual goals, as well as on their learning behaviour and other outcome variables.

Students' need support and motivation for homework
Idit Katz, Ben-Gurion University, *Israel*
Avi Kaplan, Ben-Gurion University, *Israel*

This presentation will describe findings from a research project that employs SDT to investigate the role of teachers in students' motivation for homework. More specifically, we tested the hypothesis that teachers' support of students' psychological needs would be associated with increased adaptive motivation for homework. Thirty-four 4th grade and 49 8th grade students responded to surveys asking about their motivation for homework, their level of psychological needs, and their perceptions of teacher's behavior as supporting their needs in the context of homework. Findings supported the mediating role of perceived teacher's support of students' needs in the relation between grade-level and student intrinsic motivation for homework. Moreover, the role of perceived teacher support of psychological needs in student motivation for homework was found to depend on students' level of expressed needs. The presentation will elaborate on findings from a larger project which involves data from parents and from participants in two cultural groups.

Interest experience in the classroom: The role of autonomy support and individual interest
Yi-Miau Tsai, Max Planck Institute for Human Development Berlin, *Germany*
Mareike Kunter, Max Planck Institute for Human Development Berlin, *Germany*
Oliver Lüdtke, Max Planck Institute for Human Development Berlin, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development Berlin, *Germany*

Research based on self-determination theory has found teachers' instructional behaviors, especially with respect to the support and suppression of students' autonomy, to influence students' interest. The present study aims to replicate these findings with intra-individual data from authentic classroom learning situations and, moreover, to investigate whether these effects are equally applicable to all students. Participants were 261 (57% female) 7th-grade students, aged 12 to 14 years. All students were recruited from nine classes in two academic-track secondary schools. After surveying students' gender, school performance, and individual interest, we assessed students' interest experience and three aspects of autonomy-related support and suppression after every mathematics, German (native language instruction), and second foreign language lesson over a 3-week period. On average, 25 lesson-specific measures were collected for each student. Hierarchical linear modelling conducted separately for the three subjects provided consistent support for self-determination theory. Students showed higher interest in lessons which

they perceived as providing an autonomy-supportive climate (.27 p involving them cognitively (.21 p). In contrast, lower levels of interest were reported for lessons where the teachers' behaviour was perceived as controlling (-.15 p). However, significant variance components were observed for all effects, suggesting that the effects of autonomy support and control may not be identical for all students. Student characteristics that may moderate these effects will be explored and discussed.

The effect of an extrinsic rather than intrinsic goal pursuit and of extrinsic rather than intrinsic goal promotion on performance, persistence and ethical functioning
Bart Duriez, University of Leuven, *Belgium*
Bart Soenenes, University of Gent, *Belgium*
Willy Lens, University of Leuven, *Belgium*
Maarten Vansteenkiste, University of Gent, *Belgium*

The aim of this research was to examine contradictory hypotheses that can be derived from self-determination Theory (SDT; Kasser & Ryan, 1996) and the match-hypothesis (Sagiv & Schwartz, 2000) regarding the impact of intrinsic versus extrinsic goal pursuit and intrinsic versus extrinsic goal promotion by the educational environment on optimal learning and well-being. From SDT-perspective, the pursuit of intrinsic goals is characterised by an in-ward orientation and is consistent with the satisfaction of one's basic psychological needs, whereas the pursuit of extrinsic goals is characterised by a focus on external signs of worth and tends to be unrelated to basic need satisfaction. Therefore, these different types of goals should be differentially linked to psychological well-being and optimal learning. According to the match-hypothesis, the match between one's own personal goals and the goals promoted by the social environment should matter in explaining individuals' well-being and learning, so that extrinsic goal oriented individuals would function most optimally when being exposed to an extrinsic goal environment. One correlational study among highschool students (N = 246) and one experimental study among 5th and 6th grade children (N=138) could not provide evidence for the match-hypothesis. Instead, the pursuit of intrinsic relative to extrinsic goals positively predicted well-being and negatively predicted externalizing problem behavior and internal distress among extrinsic goal oriented individuals who find themselves in a learning climate that emphasizes the pursuit of extrinsic goals. Furthermore, it was shown that the induction of extrinsic relative to intrinsic goals as a means to motivate children to put effort in the learning activity at hand undermines performance and persistence, even among learners who strongly value the pursuit of extrinsic goals. We conclude that students, teachers and, more generally, school principals might want to focus on the promotion of intrinsic goals to facilitate learning, performance, and psychological well-being.

Congruence of students' goals: Relations to subjective well-being and interest
Husemann Nicole, Max Planck Institute for Human Development Berlin, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development Berlin, *Germany*
Oliver Lüdtke, Max Planck Institute for Human Development Berlin, *Germany*
Gabriel Nagy, Max Planck Institute for Human Development Berlin, *Germany*

The present study explored how the congruence between individual intrinsic and extrinsic goals and perceptions of fellow students' goals is associated with subjective well-being (SWB) and interest in the field of study. Self-determination theory (SDT) distinguishes two classes of goals in terms of their content: intrinsic life goals are concordant with basic psychological needs and thus positively related to SWB, whereas extrinsic goals are focused on attaining the recognition of others, and are assumed to be negatively related to SWB. An environmental-match perspective

places less emphasis on the content of a goal and maintains that congruence between individual and environmental goals is crucial for SWB. The role of the content and person-environment fit of life goals for SWB and interest was examined in a sample of over 1700 German university students. Both individual life goals and the perceived life goals of fellow students were assessed. In line with a self-determination perspective on life goals, extrinsic goals were negatively and intrinsic goals positively associated with well-being. In line with a person-environment fit perspective, congruence between individual goal profiles and the perceived goal profiles of fellow students was positively associated with SWB and interest. Subsequent in-depth analyses showed that congruence between individual and perceived environmental goals was more beneficial for SWB than incongruence in the case of affiliation goals, and that agreement on affiliation goals being important was related to higher SWB than agreement on affiliation goals being unimportant. Thus, our results suggested that both the content of life goals and the person-environment fit were related to SWB and interest. More generally, students' perceptions of their environment were related to their emotional and motivational experiences, substantiating the notion that "the people make the place."

E 6
29 August 2007 14:30 - 16:30
Room: -1.63
Symposium

Strong (and weak) methods in studying teaching

Chair: **Harm H. Tillema,** Leiden University, *Netherlands*
Organiser: **Juan Jose Mena Marcos,** University of Salamanca, *Spain*
Organiser: **Harm H. Tillema,** Leiden University, *Netherlands*
Discussant: **Harm H. Tillema,** Leiden University, *Netherlands*

Aim: This symposium explores and clarifies solutions that researchers of teaching have constructed to link their 'object' of study to their 'method' of finding evidence. Reciprocity or alignment between what a researcher intends to find and how a research design is constructed will frame the findings that are reported from a study. A key concern would be how collected evidence represents the process under study. We explore the contention: the more closely a selected method of study (i.e., research design) represents the object of study, the more accurate it can depict (figure) what we maintain about teaching (ground). We follow a searchlight strategy in our exploration of research designs that could inform a researchers' debate on data collection and data analysis on teaching. This is done by scrutinizing the methods chosen in studies of teaching, as to offer a platform on how to comprehend strong (and weak) research designs As a result of this discussion we aim at establishing criteria for research designs in the study of teaching. Relevance: In this symposium, we consider how methods chosen to study teaching are aligned with researchers' interpretations (approaches) of teaching (i.e., how they represent the object under study). Specifically we look for: (a) articulation of the object of study, (b) coverage of (components of the) object/process being studied and (c) ways of measurement. Based on these criteria we invited participant/researchers to explicate the way in which they studied teaching as articulated through their: object, method and analysis of research. In representing studies of teaching in this way we try to gain consistent knowledge about solutions or standards to capture the dynamic nature of the research process in teaching. It is not aimed at offering guidelines for

conducting research instead we build a platform to discuss the methods by which we represent teaching.

'When is critiquing learning? A study of teacher learning through critiquing video'
Mary Sheard, University of Nottingham, *United Kingdom*
Elaine Cockburn, University of Nottingham, *United Kingdom*

The paper draws on a study of teacher learning through critiquing video representations of literacy instruction to consider new potentials for teacher learning. Thirteen experienced elementary school teachers responded to videos of literacy teaching using a computer-mediated interface for critiquing digital video and a more traditional way of viewing video using CDRom. The study used extracts of literacy training videos and a non-training video filmed to share professional development in practice. Video-as-method was used as a research tool for investigating teachers' constructive learning represented in discourse. Teachers responded to the selected video representations as pairs or individuals and in constrained tasks through oral protocols and written textual responses. The paper considers the methodological assumptions underpinning the use of video-as-method, and important methodological issues associated with it. In particular the paper argues the importance of the method in activating prior knowledge through the association of ideas in a constructive learning context. The paper argues that in this way video-as method provides a less constrained method than interviews or focussed tasks. From a sociocognitive perspective the paper suggests that while critiquing occurs infrequently in teachers' discourse in critiquing video representations, learning is associated with relatively high frequencies of explaining, explicating and arguing and of 'critiquing action' evidenced in teachers' discourse. Critiquing action, derived from literary theory, included representing reality, exploring ideology, uncovering meaning, and defending an interpretation of teaching represented on video. In reference to video-as-method, the paper draws conclusions on how teachers learn through critiquing video by identifying learning episodes, language markers of learning and learning profiles in teachers' discourse.

Talking and learning about teaching – Pre- and post-lesson dialogues of student teachers and their mentors
Annelies Kreis, College of Teacher Education Thurgau, *Switzerland*

The paper draws on a study of teacher learning through critiquing video representations of literacy instruction to consider new potentials for teacher learning. Thirteen experienced elementary school teachers responded to videos of literacy teaching using a computer-mediated interface for critiquing digital video and a more traditional way of viewing video using CDRom. The study used extracts of literacy training videos and a non-training video filmed to share professional development in practice. Video-as-method was used as a research tool for investigating teachers' constructive learning represented in discourse. Teachers responded to the selected video representations as pairs or individuals and in constrained tasks through oral protocols and written textual responses. The paper considers the methodological assumptions underpinning the use of video-as-method, and important methodological issues associated with it. In particular the paper argues the importance of the method in activating prior knowledge through the association of ideas in a constructive learning context. The paper argues that in this way video-as method provides a less constrained method than interviews or focussed tasks. From a sociocognitive perspective the paper suggests that while critiquing occurs infrequently in teachers' discourse in critiquing video representations, learning is associated with relatively high frequencies of explaining, explicating and arguing and of 'critiquing action' evidenced in teachers' discourse. Critiquing action, derived from literary theory, included representing reality, exploring ideology, uncovering meaning, and

defending an interpretation of teaching represented on video. In reference to video-as-method, the paper draws conclusions on how teachers learn through critiquing video by identifying learning episodes, language markers of learning and learning profiles in teachers' discourse.

Experienced teacher learning: mapping the learning activities and learning outcomes associated with a reciprocal peer coaching trajectory.
Rosanne Zwart, Radboud University of Nijmegen, *Netherlands*
Theo Wubbels, Utrecht University, *Netherlands*
Sanneke Bolhuis, Fontys University of Applied Sciences, *Netherlands*
Theo Bergen, Radboud University of Nijmegen, *Netherlands*

Today, working together with colleagues in teams, dyads or small groups is more and more regarded as a useful way of stimulating professional development of teachers in schools. Reciprocal peer coaching (RPC) is an example of a professional development trajectory in which teachers collaborate to support each others' professional growth. But which aspects of this trajectory stimulates teacher learning? What do teachers think, how do they feel or how do they act which makes them learn? In this paper we want to elucidate the learning processes of eight experienced teachers (four coaching dyads) who take part in a RPC trajectory, by focussing on both learning activities and learning outcomes. We employed multiple data collection methods, i.e. repeated measurements with three different instruments (observation, questioning and narratives) over a period of one year. The data sources were: audiotapes of coaching conferences (recorded thinking and acting), audiotapes of semi-structured interviews held by telephone directly after the coaching conference (reported thinking, reflection on action), and digital diaries with teacher reports of learning experiences (reported thinking, reflection on action). Qualitative analyses of the data resulted in a total of 94 sequences of reported learning outcomes and occurring learning activities. Transcripts of the coaching conferences gave insight into the activities undertaken during classroom teaching, observing or looking back on practice afterwards. The interviews shed light on each teacher's perception of the possible cognitive and behavioural changes they gained from the coaching process. The digital diaries provided insight into learning processes that were important for teacher's development, both with and without a perceived relationship between this experience and taking part in the RPC trajectory. By choosing this approach of data collection we obtained rich and diverse sources of data which increased our ability to disclose the complex process of teacher learning in an integrated way.

Effective teaching: An empirical model on the factors influencing the quality of teaching practices
Juan Antonio Castro Posada, University Pontificia of Salamanca, *Spain*
Juan Jose Mena Marcos, University of Salamanca, *Spain*

The paper draws on studying teacher effectiveness by statistically determining the factors which predict this construct and the relationship that exists between them. In this sense our main purpose is to elaborate an empirical model on the components that explain how teacher efficacy can be explained. From a theoretical perspective it is suggested how effective teaching is not only related to internal factors that directly influence the professional activity (i.e. critical thinking, leadership, class planning) but also external causes (i.e. school atmosphere) that play a more indirect but decisive role in teachers' performance. Similar results derive from our study. Sixty-five teachers from different levels (from Kindergarten to Secondary level) gave a written answer to 79 Likert-type items. A causal model was constructed through cluster analysis and factorization of resulting components. We identified three types of both internal and external factors distributed as follows: (1) five predictive factors or causes (attention to students' specific needs, working with parents,

students' personal and social development, support provided by parents and counselling teams and the diagnosis function of assessment); 2) three predicted factors or effects (guidance towards students' optimal performance, promotion of the connection to the educational centre on behalf of students and the efficient use of ICTs in the educational centre), and 3) five intermediate factors (collaboration between teachers, classroom and school management, promotion of empathy, efficient assessment and a suitable school atmosphere). Focusing on the methodological part, aim of the symposium, the main conclusion derived from the study suggests that the use of a standardized and validated study method (statistical model) is a strength when generalizing the results. Therefore, the method itself guides the study design. However, it could be discussed whether only questioning can determine a complex model on efficient teaching performance.

E 7
29 August 2007 14:30 - 16:30
Room: 2.54 Novobátzky
Symposium

Meeting special educational needs of young students effectively: Where to start and what to include?

Chair: **Geerdina van der Aalsvoort,** Leiden University, *Netherlands*
Organiser: **Geerdina van der Aalsvoort,** Leiden University, *Netherlands*
Discussant: **Dolly van Eerde,** Utrecht University, *Netherlands*

Studies about special educational needs with young students show that teachers wishing to teach these children effectively, hopefully look out for reliable tests that can assist them in meeting the needs of students developing at risk at the start of their school career and eliciting their potentionals for learning. The symposium brings together the findings of four research groups that allow a discussion about educational relevance of information about students from four perspectives. The first paper by Tymms and his colleagues states that reliable prediction of school performance assists teachers in identifying what schooling content is required from Grade 1. They report about a longitudinal study of 3500 children at the start of school until age 11. In the second paper Aubrey and her team points at the paucity of systematic procedures for monitoring outcomes from different types of provision and hence cost effectiveness. They analysed existing monitoring data for students with moderate learning difficulties in one London borough to assist the process of targeting more effectively students with most need. The third paper of Van der Aalsvoort and her colleagues includes an empirical study about the concept of school readiness, since teachers in Grade 1 and 2 have strong opinions about students with special educational needs even before formal schooling starts. They present the validity of teachers' opinion on school readiness by comparing their views with standardized tests. Janus' paper is the fourth paper of the symposium that includes a study about the parents of a child with special educational needs. Her data show that while the school system may attempt to address the needs of students through individual educational plans, parents often report many problems with the actual execution of those plans.

Links between children's starting points and finishing points
Peter Tymms, CEM Centre Durham University, *United Kingdom*
Christine Merrell, Cem Centre Durham University, *United Kingdom*
Brian Henderson, Cem Centre Durham University, *United Kingdom*
Stephen Albone, Cem Centre Durham University, *United Kingdom*
Paul Jones, Cem Centre Durham University, *United Kingdom*

Data from the PIPS on-entry baseline assessment in England for 3507 pupils collected in 1999 at the age of 4 were linked to outcome measures in reading, mathematics and science at the age of 11 in 2005. The baseline assessment was found to be a good predictor of attainment at the end of 7 years of schooling, correlating up to the 0.7 level. In common with other studies, the ability of children to identify letters was found to be a good predictor, but digit identification was equally good both for reading and mathematics. A wide range of additional variables, including, vocabulary, concepts about print, simple and formal sums were found to improve the prediction, although it still remained difficult to reliably identify special needs at an early stage. Home background added little to the prediction once controls had been made for the baseline measures. The results are discussed in relation to: The value of a range of variables as predictors in the classroom context; the identification of special needs with particular attention to sensitivity and specificity; the impact of schooling and the use of feedback strategies designed to improve provision.

Overcoming Barriers to Learning: How do we include young children with moderate learning difficulty?
Carol Aubrey, The University of Warwick, *United Kingdom*
Ray Godfrey, The University of Warwick, *United Kingdom*
Susan Manigan, The University of Warwick, *United Kingdom*

There is a lack of well-designed studies that relate outcomes for special educational needs (SEN) students to costs for different placements. Despite importance attached to a range of outcomes – social academic, affective and life-change – there has been a paucity of systematic procedures for monitoring outcomes from different types of provision and hence effectiveness and cost effectiveness. This study seeks aimed to analyse existing monitoring data for pupils with moderate learning difficulties in one London borough in order to assist the process of targeting more effectively pupils with most need; providing guidance on how best to make use of existing resources; helping refine criteria for statements of SEN and levels of support in the context of a clear overall policy on inclusion and monitoring of inclusive practices. It is also intended to consider preventative approaches and early intervention compatible with existing experience and expertise of senior local authority and school personnel, parents and children. Aims were addressed through analysis of existing performance data for approximately 23,500 pupils at age 7, 11 and 14 in state mainstream and special schools over a three-year period from 2003 to 2005; telephone survey of relevant school personal; case studies of three settings, a children's centre, primary and special school, focusing on children aged 3 to 7; and analysis of relevant government and local authority policy documents. Multilevel modelling analysis of performance data has been carried out, taking account of age, schooling stage, sex, ethnic origin, and level of SEN. Data has been gathered and analysed for the survey and case studies to be nested within the quantitative analysis. The notion of full participation of SEN pupils has gone largely unchallenged and there has been little serious debate. This study will make a contribution to this debate, supported by robust evidence.

School readiness: A reliable concept to transition decison-making?
Geerdina van der Aalsvoort, Leiden University, *Netherlands*
Marjolein van der Sluis, Leiden University, *Netherlands*
Carienke Kegel, Leiden University, *Netherlands*
Anneke van der Hoeven, ITS Radboud University, *Netherlands*

School readiness refers to the transition of Grade 1 to 2. Definitions of school readiness differ greatly with respect to the role of factors related to school readiness. Therefore we carried out a study with 20 so-called school ready (SR) and 20 not-school ready students (NSR) from regular primary schools who were selected by their teachers. The group of SR students was older and had had more months of schooling than their NSR peers. We collected data from both groups with respect to characteristics attributed to children such as temperament and cognitive development, to actual child performance on early literacy and numeracy tasks, and to context with respect to ses, social support during tasks, and attributed parental involvement in school matters. The findings were compared between groups by t-tests and correlations. The findings reveal that both actual as well as attributed school performance was higher in the SR group than in the NSR group. Social support and ses, however, were comparable between the groups. Moreover, teachers' perceived parental involvement of the SR group was higher than that of parents of a NSR child. The findings are discussed with respect to the meaning of transition for children concerning the role of age and months of schooling in relationship to school readiness.

Children with special educational needs at school entry: process, planning and parent experience
Magdalena Janus, Mc Master University, *Canada*

The specific educational needs of children who are classified as having special needs at school entry tend to be very heterogeneous, ranging from behavioral-emotional, to speech, developmental delay, and multiple problems. While the school systems attempt to address these differences in their individual education plans, parents often report many problems with the actual execution of the plans. This presentation will highlight the range of special needs present in a population of 5-year-old kindergarten students in a large Canadian city, and describe the experiences of 20 families of children with special needs in the first year of kindergarten. Majority of these families found that their expectations in terms of receiving the promised educational aids and support were not met, thus preventing the optimal educational development for the child. Barriers and bridges in facilitating the setting up of feasible educational plans for children with special needs are discussed.

E 8
29 August 2007 14:30 - 16:30
Room: 3.67 Békésy
Symposium

Researching teachers' constructions of student diversity in contemporary educational settings

Chair: **Peter Renshaw,** University of Queensland, *Australia*
Organiser: **Peter Renshaw,** University of Queensland, *Australia*
Discussant: **Guida Abreu,** Oxford Brookes University, *United Kingdom*

Educators across the world face increasingly socio-culturally diverse classrooms resulting from large-scale trans-national mobility. In this symposium, presenters draw upon extensive research projects in Europe and Australia to address the question of how educators understand and construct student diversity, and how they strategically adapt their practices to provide inclusive educational experiences for students. Diversity has typically been theorised as a set of characteristics that students bring with them into educational settings. Students' characteristics are regarded as a-priori, stable traits that effective teachers consider in planning lessons. The goal is to fit classroom pedagogy to the needs of different students. The powerful formative influence of pedagogical practices on students' identities and capabilities over time, reinforces the sense that differences between students are indeed pre-existing and fixed. An alternative frame for researching diversity is explored in this symposium. Drawing upon a family of discourse and socio-cultural theories of human action, the presenters in the symposium theorise diversity as emergent and socially constructed in the context of institutional, social and linguistic practices. Rather than being a set of stable background variables, 'difference' between students is seen as contingent on institutional practices of selection, grouping, naming and differentially providing students with learning activities. Practices can be quite blunt as in ability streaming, but they can also be subtle, shifting and embedded in everyday interactions. In this symposium, participants provide research evidence on both kinds of practices - the institutional processes of assigning students to different educational streams, as well as to the more subtle and embedded everyday practices of constructing students as different kinds of learners. The implications of this challenging research, particularly in terms of ensuring ethical and inclusive educational policies and practices, will be addressed by each of the participants as well as by an expert discussant.

Teachers' funds of knowledge for framing student diversity in the middle years: Institutional constraints and teachers' professional agency.
Peter Renshaw, University of Queensland, *Australia*
Raymond Brown, Griffith University, *Australia*
Elizabeth Hirst, Griffith University, *Australia*

While policy has consistently advocated the deployment of inclusive forms of pedagogy for an increasingly diverse student population, recent evidence across different countries suggests that teachers seldom incorporate recognition of student diversity in their teaching practices. Our aim in this presentation is to document how middle-years' teachers in a rapidly growing suburban area in Southern Queensland, Australia, recognise and 'name' student diversity and how they rationalise their classroom practices in dealing with diversity. We theorise diversity as an aspect of institutional and socio-cultural practices, rather than a set of inherent individual traits. The data

come from interviews with 16 teachers, from 4 separate schools which were chosen on the basis of: (i) having a range of middle-years classes (grades 5-9); and (ii) catering to a diverse community where incomes were variable and where there had been recent mobility. In content analysis of the interviews using a category system devised by Paine (1989) we found that teachers deployed mainly an individual differences orientation and a social categorical orientation to describe student diversity. The teachers fore-grounded the difficulties that they faced in teaching low ability students and those from different ethnic backgrounds, countries of origin and from socially disadvantaged families (low income, single-parent, latch-key kids). Regarding teachers' rationales, we found that most teachers sought to provide "high ability" students with opportunities to "flower" and low ability students with opportunities "to try". There were contrasts to the typical viewpoint. A few teachers regarded diversity as valuable and desirable per se rather than problematic, and they saw themselves as active agents in the construction of students as different kinds of learners. The implications of our findings for policy and teacher education programs are elaborated in the presentation.

Teachers' (in)sensitivity to cultural and linguistic diversity in dyadic teacher-student interactions in multi-ethnic classrooms
Ed Elbers, Utrecht University, *Netherlands*
Maaike Hajer, Utrecht University, *Netherlands*

This presentation concerns dyadic teacher-student interactions in two multicultural classrooms at secondary schools in the Netherlands. The schools have a population of native Dutch students and students from various migrant groups (with Moroccan and Turkish backgrounds), mainly second generation. The students are 12 -14 years of age. We made video- and audio-recordings of 23 mathematics lessons (10 in one classroom and 13 in the other). In our analysis we focussed on dyadic teacher-student interactions (there were 100 dyadic interactions in the two classrooms), mostly occurring while the students were working individually at their assignments. Teachers in these classrooms seem not to be sensitive to the diversity of their students, both with respect to language and mathematic competence. The consequence of this lack of sensitivity for students' learning and achievements will be discussed as well as ways of empowering teachers to make a more focussed use of the dyadic interactions.

Migrant parents learning to talk with teachers: the construction and deconstruction of institutional categories.
Mariëtte de Haan, Utrecht University, *Netherlands*
Inge Wissink, Utrecht University, *Netherlands*

In this presentation we will focus on how teachers and migrant parents in the Netherlands negotiate the advice students receive at the end of primary school to attend a particular secondary school. In particular we will focus on how both teachers and migrant parents adopt, reconstruct or reject institutional categories, strategies and procedures as they discuss student characteristics, person-environment concepts as well as basic concepts of education. The migrant parents themselves vary in their socialization into Dutch institutional settings and the research focuses on how both parents and teachers deal with this situation when they negotiate and decide about the institutional futures of their children/students. The preliminary results show that parents with more experience with Dutch schools differ in the kind of dialogues they construct with teachers. More experienced migrant parents both are more able to both adopt and reject the institutional categories put forward by the teacher and are able to relate these to discourses outside the institutional framing. These strategies are effectively used to negotiate and criticize the institutional discourse

used by the teacher to defend particular advice regarding schooling. Less experienced migrant parents are less familiar with both the institutional categories and procedures and instead of using them strategically, they work around them. These findings indicate that parents' socialization into institutional discourses is qualitatively different for recent and more established migrants, which most likely reflects different stages in the migratory process as related to their experience with schooling.

Encountering pupil diversity in the multiethnic classroom: Dialogical perspectives on discourses of teaching and learning
Lutine de Wal Pastoor, University of Oslo, *Norway*
Roger Säljö, Göteborg, *Sweden*

A major educational challenge that many European countries presently face is to deal with the linguistic and cultural diversity of current classroom populations and to improve the educational opportunities and achievements of ethnic minority children. Educational research emphasizes the central role active participation in classroom discourse plays in developing pupils' knowledge. One reason why minority pupils' school achievements often are unsatisfactory may be that they get too few opportunities to actively participate in meaningful classroom discourse. In this paper, we explore some features of how teachers attempt to adjust classroom discourse to pupil diversity in the multiethnic classroom. How do teachers and pupils with linguistically and culturally diverse backgrounds develop shared understandings? Which opportunities do teachers create for pupils to actively engage in discourse? To what extent do teachers acknowledge and incorporate minority pupils' knowledge and prior experiences into their classroom practice? Finally, we address the following questions. To what extent can the observed instructional practices be related to educational policies in Norway? Which views of learning underlie the teachers' practices? How can these be understood in relation to the national educational context? The paper is based on analysis of authentic discourse excerpts, using transcribed audio recordings, field notes, interviews and school documents. The empirical research was carried out in a multiethnic third grade class in Norway. It demonstrates the composite role that language and discourse play in learning. It is argued that various discourse practices, creating different premises for pupil participation, afford different ways of dealing with the pupil diversity encountered. A responsive, dialogic teaching approach promotes pupils' motivation and engagement in discourse, and consequently, their possibilities for learning. Yet, the teachers in this study still relied on educational practices that were basically monolingual and monocultural.

"I can tell you all you need to know about diversity in just four words … everyone … is … an … individual": Teaching understandings of diversity in teacher education programs as a collaborative practice.
Annette Woods, Griffith University, *Australia*

The quotation in the paper's title is a comment by one teacher educator on a colleague's work to raise consciousness among her students regarding social justice, diversity and productive pedagogical engagement. In this paper I call on Foucault's notion of grids of specification to unpack how diversity and social justice are articulated within the course documents and assessment tasks of a teacher education program in Australia. The current widespread perception of pervasive and problematic student diversity in schools has highlighted the need for teacher educators to articulate understandings of social justice and diversity on the one hand, with effective pedagogical practices on the other. A common initial strategy in teacher education programs is to challenge prospective teachers' reliance on individualistic deficit explanations and

to offer more positive and productive ways of naming and engaging with student diversity. However as the quotation in the title reveals, in the present neo-liberal higher education context, teacher educators themselves often reduce consideration of diversity and social justice to a consideration of individual and essentialised characteristics. Innovative ways of engaging diversity as difference often rely on the practice of educators acting alone, rather than being a collaborative institutional response. This paper addresses the ambiguity and dilemmas of deploying social justice and diversity as educational concepts in teacher education, and considers what institutional enablements and constraints are evident where collaborative social justice practices form the foundation of a teacher education program

E 9
29 August 2007 14:30 - 16:30
Room: 1.60
Symposium

Quality and effects of extra-familial care and education on children's development

Chair: **Wolfgang Tietze,** Freie Universität Berlin, *Germany*
Organiser: **Marianne Schuepbach,** University of Berne; PH FHNW, *Switzerland*
Discussant: **Louis Tavecchio,** University of Amsterdam, *Netherlands*

In many countries, the importance and impact of centre-based education and care in the pre-primacy and the primacy school period, is heavily debated and a matter of concern. Changes in family structures and in patterns of labor force participation of women with young children call for extended and improved care and education provisions. In addition, the inclusion of migrant children and children with a low educational and socio-economic background is a matter of special concern. The resulting societal challenges relate to both, the availability and accessibility of provisions as well as their educational quality. Given this context, the symposium addresses the following two major questions: (1) What effects of extra-familial centre-based care and education in pre-primary and school-age education and care provisions can be observed regarding children's cognitive and social-emotional development? Especially, what is the impact of different educational models on children's development? (2) What do we mean when we are talking on quality in the respective provisions? How should educational quality be defined and how can it be assessed and ensured in practice? Presenters of the symposium are researchers from Germany, Switzerland and Vietnam.

EduCare - Study on the quality and effectiveness of education and care for primary-school-age children (age 6 – 8) in family and institutional settings
Marianne Schüpbach, University of Berne; PH FHNW, *Switzerland*
Walter Herzog, University of Berne, *Switzerland*

The performance of Swiss school children in PISA 2000 alarmed both the public and education experts. As a response, action measures in various areas have been put forward with the aim to address weak points in the Swiss education system. One recommendation is the expansion of school-age care programs. The need for these programs is also supported by societal and economic changes and the consequent political demands. There is no research on the effectiveness or the

effects of after-school care and education in Switzerland yet. The international situation is similar. There are few studies that focus on the effects of family and out-of-family care related to developmental outcomes of children. Most of these studies are set in the pre-school age. However the results of these studies and those of the pre-school sector cannot be extended in general or applied without examination to the varying Swiss circumstances. In comparison to other countries, such as the United States or France, school-age education and care programs in Switzerland are very different in their structure. There are offerings at different times of the day. It is not the rule in Switzerland that children are at school for the whole day. The research project presented in this paper, which is funded by the Swiss National Science Foundation will take place in the German-speaking part of Switzerland and is designed so as to provide empirical evidence and therefore a basis for decisions pertaining to (Swiss) educational policies. This longitudinal study will address questions relating the quality of different settings of institutional and family care to their effects on children's cognitive and socio-emotional development in the first years of school (age 6-8). The hypotheses will be tested using a longitudinal survey with quasi-experimental design using two testing groups and one control group. We will present first results.

Quality of stimulation in preschools from an individual child perspective: assessing environmental conditions of early childhood development
Susanne Kuger, Otto-Friedrich-University Bamberg, *Germany*
Katharina Kluczniok, Otto-Friedrich-University Bamberg, *Germany*
Hans-Günter Rossbach, Otto-Friedrich-University Bamberg, *Germany*

Considering the ongoing international debate about "good" quality in early childhood education we focus on the differentiation between distinct but interrelated concepts. Educational quality can be percepted at group level and at a single child's level. Moreover both concepts contain aspects of global and domain-specific quality of stimulation. The research presented is part of a larger German research group studying educational processes, selection decisions and competence development in preschool and primary school age children (BiKS, Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vor- und Grundschulalter). In our presentation we therefore address structure, stability and changes in quality of stimulation at group level as well as at an individual child's level. Using a multi-method longitudinal design we analyze the data of two measurement points of 102 children (mean age 45 and 51 months, SD=3). Our focus in data analysis lies on the distinctness and interrelatedness of quality at group level and at single child level, both integrating aspects of global and domain-specific quality. An outlook on further results including measurement points throughout the target children's preschool years is given.

Short-term and long-term effects of quality characteristics in families
Wolfgang Tietze, Freie Universität Berlin, *Germany*

Early education and its quality has become a major topic in the educational systems of many countries. The present study deals with both, the educational quality in family-settings as well as in centre-based settings, and investigates its impact on various domains of child development, including language development, social development and mastering of daily living activities. The study includes a cross-sectional and a longitudinal part. In the cross-sectional part a random sample of some 400 four and a half year old kindergarten children, drawn in five states of Germany, was investigated in regard to the educational quality of their family and kindergarten settings and their developmental status in various developmental domains. In the longitudinal part of the study, the children were reassessed four years later when they were at the end of grade 2.

The measures included children's language and social development, children's mastering of daily living activities as well as various measures of school achievement. In addition, the quality of the school environment of the second graders as well as the quality of their family environment was assessed at this point by direct observations and by interviewing teachers and parents. Results point to widespread and, in terms of magnitude, substantial effects of educational quality in Kindergarten settings on children's development and educational progress in both, the short and the long run. Results are discussed in terms of methodological considerations as well as in regard to policy implications for enhancing developmental and educational progress by improving quality in family and centre-based settings.

Importance of quality characteristics in kindergarten settings as rated by teachers and parents. A cross-cultural study conducted in Germany and Vietnam.
Tran Thi Bich Tra, National Institute for Educa. Strategy +Curriculum, *Vietnam*
Wolfgang Tietze, Freie Universität Berlin, *Germany*

There is a serious theoretical debate if educational quality can be regarded as a more or less universal construct or if it should be considered (and conceptualized) as a cultural specific construct (cf. Dahlberg, Moss & Pence 1999). Either assumption has strong implications for cross-cultural comparisons on educational quality. The present study was designed to test to what extent various quality criteria were rated as being important (or non important) in the two culturally diverse countries, Germany and Vietnam. The study used the quality criteria of the Early Childhood Environment Rating Scale (ECERS-R) by Harms, Clifford and Cryer (1998), an internationally well-known quality assessment instrument. Kindergarten teachers and parents of kindergarten children in both countries were requested to rate the importance of the quality criteria of this instrument for the national early education scene. For this purpose, the ECERS quality indicators (items) were rephrased in a way that their importance could easily be rated by teachers and parents. The procedure followed an approach used by Cryer and Burchinal (1997) and Cryer, Tietze and Wessels (2002). Results point to a high degree of similarity of importance ratings in both cultures supporting the assumption of a universal concept of educational quality in the two culturally diverse countries. However, a few quality characteristics appear being unique. Based on the results, implications for the validity of cross-cultural studies in educational quality are discussed. It is concluded that the ECERS can meaningfully be used as a quality assessment instrument in culturally diverse contexts.

Educational quality of all-day schools
Natalie Fischer, DIPF, *Germany*
Ludwig Stecher, DIPF, *Germany*

School effectiveness research has shown that school quality – e.g., consensus and cohesiveness, goal clarity, parental involvement, etc. – fosters both motivational development and academic achievement. According to the extended time all-day schools offer they allow additional time to put this into practice. The focus of our contribution is on the quality of all-day educational programmes (extra-curricular activities) in terms of the general discourse on educational quality. Our data are based on the study of the development of all-day schools (StEG project), supported by a grant from the German Federal Ministry of Education and Research. About 400 schools – 35.000 students and their parents, 8.000 teachers – participate in StEG. The data are based on the first round of this German-wide longitudinal study.

E 10
29 August 2007 14:30 - 16:30
Room: 7.14
Symposium

Developing potentials for learning: Interest, time and change

Chair: **Mary Ainley,** University of Melbourne, *Australia*
Organiser: **Mary Ainley,** University of Melbourne, *Australia*
Organiser: **Ann Renninger,** Swarthmore College, *USA*
Discussant: **Suzanne Hidi,** OISE/University of Toronto, *Canada*

Current research demonstrates that interest processes influence learning in different ways according to whether interest is triggered by situational factors, or whether it stems from re-engagement as in individual interest. However, the temporal dimension of the interest-learning relation has not been closely examined. How and why does interest change as students work on specific tasks, or as they gain extensive experience in a domain? Focusing on the time period over which interest is studied permits consideration of changes in interest-learning relationships over short periods of time, as well as longer developmental sequences. Each of the presenters in this symposium will draw on multiple studies and differing time perspectives to talk about interest and change to provide symposium participants with an expanded understanding of the complex ways person and situation interact in learning. Boscolo and Del Favero consider how variations in interest and importance of text information on a topic, influence students' subsequent academic writing. Niemivirta and Ainley examine how both individual interests and task characteristics influence trajectories of change in interest across a series of similar problem tasks administered during one school year. Renninger, Bachrach and Posey use a series of studies based on within-child comparisons across domains, to describe conditions that support and sustain commitments to learn over time (years). Extending the focus to the length of time associated with undergraduate courses, Harackiewicz reports on studies demonstrating how interest and achievement goals interact and influence students' subject and course preferences, in turn, influencing learning and career paths. These research programs provide evidence of how important interest is for the development of students' potential to learn. The more detailed consideration of interest development and change presented will both further theoretical understandings of interest development and provide information to practitioners about how the process of change unfolds.

Interest in an expository text: Does it develop from reading to writing?
Pietro Boscolo, University of Padua, *Italy*
Laura Del Favero, University of Padua, *Italy*

The present study aimed at analysing how interest in a text on a social sciences topic develops when the reader uses the text information in a writing task. The study aimed at answering two research questions. First, we expected that the paragraphs or segments of a text would stimulate different types of interest in the reader: the exposition of a concept (e.g., the definition of terrorism) would stimulate an "epistemic" attitude, whereas the description of an impressive event related to that concept would activate surprise and sense of novelty. The second research question regarded the change of interest from reading a text to writing a new text on the same topic. We expected that, when writing, participants would use the segments rated as interesting to the degree to which the writing task allowed or stimulated them to use interesting information. One hundred-eighty 11th and 12th graders participated in the study, according to a 2 (interesting vs.

uninteresting topic) x 3 (types of writing tasks) design. While reading an expository text, students rated each paragraph for different aspects of interestingness and for importance in the text. After reading, participants were assigned to one of three writing tasks: 1. to sustain a point of view on the phenomenon described in the text; 2. to write a passage to be included in a volume for high-school students; 3. to write a composition on the topic. As expected, participants gave different ratings according to the category of text segments. Regarding writing, students who argued in written form used more segments rated as interesting than students involved in the academic writing task.

Developing potential: Increasing and maintaining interest.
Markku Niemivirta, University of Helsinki, *Finland*
Mary Ainley, University of Melbourne, *Australia*

A large body of research has demonstrated positive associations between interest and learning but there are as yet unanswered questions concerning how this facilitation effect occurs. This investigation focuses on the time unit of a single task and examines patterns of change in interest processes across the task. Patterns of change in task interest are then examined in relation to students' perspectives on themselves as learners both prior to task commencement and on task completion. As they commence a learning task student have expectations about task difficulty and beliefs about their own task efficacy. In this presentation we report results of modeling trajectories of change in students' task interest and connect this with pre-task and post-task judgments concerning task difficulty and self-efficacy. In addition to examining these relationships within the time-frame of a single task, the same modeling techniques are used to describe development in interest and efficacy processes across three similar tasks completed across one school year. The findings provide important insights into the role of interest in the cumulative experiences that contribute to students' on-going perspectives on themselves as learners.

Interest and self-efficacy in out-of-school choral training and biology: What develops and how?
Ann Renninger, Swarthmore College, *USA*
Jessica Bachrach, Swarthmore College, *USA*
Sara Posey, Swarthmore College, *USA*

Two mixed-method studies of inner-city children's participation in a selective out-of-school choral training program address the relation among interest, self-efficacy, and the learning environment. The first is a cross-sectional study of the self-efficacy, cognitive, and personal gains of 38 (16 boys, 22 girls) inner city children between 8 and 16 years of age; the second is an in-depth analysis of 8 children's (3 boys, 5 girls) participation in the choir and an enrichment biology program. Findings suggest that with the deepening of knowledge about a domain, feelings of self-efficacy may be expected to decline until conceptual competence about the domain develops further.

The role of mastery goals in the development of interest over time
Judith Harackiewicz, University of Wisconsin-Madison, *USA*

The dynamics of personal and situational interest and academic performance were examined in the college classroom and 7 semesters later, in conjunction with achievement goals. At the beginning of an introductory psychology course, participants reported their initial interest in psychology, achievement goals, and situational interest in course lectures (catch-1). At the end of the semester, participants (n = 858) reported their situational interest in course lectures (catch-2) and psychology (hold). In the short-term, relationships emerged among initial interest, achievement goals,

situational interest, and class performance. Longitudinally, situational interest during the introductory course, independent of initial interest, predicted subsequent course choices. Additional analyses were conducted within the semester to examine reciprocal relations among early interest, early performance on a midterm exam, situational interest, and final grades in the course. Results are discussed in terms of Hidi and Renningers (2006) four-phase model of interest development and the multiple goals model (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002).

E 11
29 August 2007 14:30 - 16:30
Room: 4.95
Symposium

Cognitive, metacognitive, and instructional issues in learning with hypermedia

Chair: **Peter Gerjets,** Knowledge Media Research Center, *Germany*
Chair: **Roger Azevedo,** University of Memphis, *USA*
Organiser: **Peter Gerjets,** Knowedge Media Research Center, *Germany*
Organiser: **Roger Azevedo,** University of Memphis, *USA*
Discussant: **Michael Jacobson,** Nanyang Technological University, *Singapore*

Symposium Overview: Learning with a hypermedia environment requires a student to metacognitively regulate his or her learning; that is, to make decisions about what to learn, how to learn it, how much time to spend on it, how to access other instructional materials, and to determine whether he or she understands the material. Accordingly, many research findings demonstrate that students' abilities to navigate hypermedia environments in a systematic and strategic way is a main predictor of effective hypermedia learning. This symposium brings together empirical findings and theoretical perspectives that focus on the relation of hypermedia navigation to (1) prior knowledge and time, (2) goal relevance of information and highlighting of links, (3) working-memory span, (4) learner characteristics like epistemological and content related beliefs as well as cognitive and metacognitive strategy use, and (5) regulation support by means of a human tutor who facilitated learners' self-regulation. The aim of this symposium is to bring together cognitive scientists, psychologists, and educational researchers to both synthesize and advance our current understanding of hypermedia navigation and of learning with hypermedia. The collection of research studies in this symposium provide a theory-based and empirically-driven approach for the design of efficient hypermedia learning environments.

Knowledge, navigation and time: Learning from online resources
Kimberly Lawless, University of Illinois at Chicago, *USA*
P. G. Schrader, University of Nevada – Las Vegas, *USA*

This presentation shares the results of a series of three experiments, conducted to more closely examine the nature of the relationships among domain knowledge, hypermedia navigation and learning outcomes. Within each study, subjects in the treatment group participated in a pre-navigation reading exercise, designed to boost their domain knowledge prior to engaging with a complex website. Across the three experiments, time spent engaging with the website was

manipulated for all participants. Taken as a whole, the results of the three experiments indicate that increasing participant's domain knowledge prior to interacting with a complex website alters the navigational strategies used and increases what is learned from this interaction. However, there is also a minimum time threshold that a user must spend engaging with a website in order to receive the benefits of the increase in prior domain knowledge.

Web navigation and cognitive modeling
Herre van Oostendorp, Utrecht University, *Netherlands*
Ion Juvina, Carnegie Mellon University, *USA*

Research on cognitive modeling of web navigation emphasizes the importance of "information scent" (the relevance of semantic cues such as link labels and headings to a reader's goal) (Pirolli & Card, 1999). We have extended this idea with the concept of "path adequacy", indicating the goal relevance of past selections. We propose a process model of web navigation based on information scent and path adequacy. We used this model to generate navigation support in the form of highlighting links that are goal-relevant. This presentation will discuss the effects of the model-based support on perceived disorientation, navigation behavior and task performance, and give suggestions for further research.

Incidental learning of hypertext structure: the role of visuo-spatial capacity
Zsófia Vörös, Budapest University of Technology and Economics, *Hungary*
Jean-Francois Rouet, CNRS and University of Poitiers, *France*
Csaba Pléh, Budapest University of Technology and Economics, *Hungary*

Two experiments investigated the role of spatial span (SS) in hypertext navigation and learning. In experiment 1, 30 adult participants with either high or low SS read a 15-page hypertext which did not include any top-level content representation. After reading, the participants were asked to draw a map of the hypertext pages and links. High SS participants drew more accurate maps than low SS participants. In experiment 2 we further investigated the role of visuospatial working memory using a dual-task paradigm. Fifty-seven adult participants with an average SS read the same hypertext as in experiment 1, while performing either a visuospatial secondary task, a verbal secondary task, or no secondary task. The participants in the visuospatial condition performed poorer on the incidental hypertext recognition and mapping task. While hypertext reading and comprehension rests mostly on verbal processing, the en route construction of a mental map seems to rely on visuospatial working memory.

Beyond media comparison studies: The role of learner characteristics, information utilization strategies, and instructional approach in hypermedia learning
Peter Gerjets, Knowedge Media Research Center, *Germany*
Katharina Scheiter, University of Tübingen, *Germany*
Brigitte Vollmann, Free University Berlin, *Germany*
Richard Catrambone, Georgia Institute of Technology, *USA*

Literature reviews on hypermedia learning have yet failed to show consistent positive effects of learner-controlled nonlinear information access. We argue that a possible reason for this lack of evidence in favor of hypermedia learning results from the fact that not sufficient attention is paid to pattern of learner characteristics and to the strategies of information utilization learners deploy. The few studies that do analyze information utilization strategies fail to link them to an instructional approach, which hampers a deeper interpretation of strategy patterns. Furthermore,

different learner characteristics have to be included into a profound analysis of hypermedia learning in order to account for individual differences and in order to explain strategy selection. In our study five different clusters of learners could be distinguished according to their characteristics with regard to domain-specific prior knowledge, cognitive and meta-cognitive strategy use in mathematics, epistemological beliefs, attitudes towards mathematics, preferences for the amount of instruction, and general meta-cognitive activity. These groups of learners differed with regard to the strategies used in an example-based hypermedia environment as well as with regard to their resulting learning outcomes.

The effectiveness of external regulating agents in facilitating students' learning with hypermedia
Roger Azevedo, University of Memphis, *USA*
Amy Witherspoon, University of Memphis, *USA*
Jeffrey Greene, University of Maryland, *USA*
Daniel Moos, University of Maryland, *USA*

Our presentation will focus on the series of studies examining the effectiveness of self-regulated learning (SRL) and externally regulated learning (ERL) on college students' and adolescents' learning about a challenging science topic (i.e., the circulatory system) with hypermedia. In a series of studies, students at different developmental levels and with little knowledge of the topic were randomly assigned either to the SRL or ERL condition. Learners in the SRL condition regulated their own learning, while learners in the ERL condition had access to a human tutor who facilitated their self-regulated learning. Across studies, we converged product (pretest-posttest declarative knowledge and qualitative shifts in students' mental models) with process (think-aloud) data to examine the effectiveness of SRL and ERL about the circulatory system during a 40-minute learning task. In general, analyses showed that students in the ERL condition learned statistically significantly more declarative knowledge and were also more likely to have shifted to a more sophisticated mental model of the topic than those in the SRL condition. The process data revealed that all students in the ERL condition used significantly more metacognitive monitoring processes and learning strategies during the learning task. However, there were qualitative differences in the number and types of self-regulatory processes used between adolescents and college students and across experimental conditions.

E 12
29 August 2007 14:30 - 16:30
Room: 0.100A
Symposium

Advances of research in help seeking

Chair: **Frank Fischer,** University of Munich, *Germany*
Chair: **Kati Makitalo-Siegl,** Ludwig Maximilian University of Munich, *Germany*
Organiser: **Kati Makitalo-Siegl,** University of Munich, *Germany*
Organiser: **Frank Fischer,** University of Munich, *Germany*
Discussant: **Stuart Karabenick,** University of Michigan, *USA*

Research on help seeking has shown that students seek help rarely when they need it and that those who need help are often the ones least likely to ask for it. Students, who do not seek help when it

is necessary, set themselves at a disadvantage position with respect to learning. Beyond personal characteristics, several factors in the learning environment and in the broader educational context have been identified to moderate and mediate help-seeking activities. In recent years, there has been increasing awareness of the complexity of the interplay of help-seeking processes with respect to learning and instructions in real classroom situations. In particular, the roles of the teacher, of technologies, and the educational context have been considered more thoroughly in recent studies. Reflecting these advances, the focus of this symposium will be on the analysis and facilitation of help-seeking processes in the classroom. An overarching goal of this symposium is to bring together different approaches dealing with the investigation of help-seeking processes in order to contribute to an accumulation of scientific knowledge on processes of help-seeking in the classroom, as well as on factors of the learning environment influencing these processes under different contextual constellations. Though all of the contributions take account of this complexity, some contributions to this symposium focus on the role of personal characteristics for help seeking (Ryan, Butler and Luckin) whereas others highlight the importance of characteristics of technology (Aleven et al.; Luckin) and instructional approach (Mäkitalo-Siegl et al.) in learning environments. As a specific aspect of the learning environment, Butler investigates the teacher in the role of help-seeker and Mäkitalo-Siegl and colleagues examine the teacher as help-giver. The impact of the social context upon help seeking is emphasized in the contributions of Luckin and Butler.

Help-seeking strategies and academic success during early adolescence
Allison M. Ryan, University of Illinois, *USA*

The present research examined the proposal that students' help-seeking behavior during the transition to middle school is important for their academic success. Help seeking is conceptualized as a motivated behavior reflecting students' social and academic goals. The guiding premise is that goals set in motion different help-seeking processes which differentially predict adolescents' academic achievement. Three different help-seeking tendencies were examined: avoidant (avoid asking for help altogether when they need it), dependent (tend to ask for help the minute they encounter difficulty; need to develop more independence), and appropriate (ask for help when they truly need it but are not overly dependent; do not ask for help the minute they encounter difficulty). Controlling for prior achievement, avoidant help seeking was associated with lower subsequent achievement. Controlling for prior achievement, appropriate help seeking was associated with higher subsequent achievement. Students' social goals were stronger predictors of help seeking than academic goals. In particular, when students' were focused on social demonstration goals (e.g. "looking cool" in front of peers and "not looking foolish") they were more likely to avoid help seeking with their academic work. Thus, students' social motivation has implications for their academic engagement and achievement. The paper will discuss implications for promoting achievement in young adolescents.

Competitive schools, reluctant help seekers: Contextual influences on help seeking among students and teachers
Ruth Butler, Hebrew University of Jerusalem, *Israel*

Research generated by achievement goal theory has shown that students' perceptions of classroom emphases on learning versus competitive success promoted and undermined help seeking by fostering mastery versus ability goals for schoolwork. The first aim will be to extend this line of research by examining the effects of tracking. Study 1 used a quasi-experimental design to compare 941 students in Grades 5 and 6 in schools in Israel that did or did not track schools in

math. Responses to survey measures of achievement goals and help seeking confirmed that tracking served as a salient relative ability cue that undermined help seeking by enhancing student ability-approach and ability-avoidance goals for math. The second aim was to extrapolate from theory and research on students' achievement goals and help seeking to examine contextual influences on teacher help seeking. Interestingly, no published studies have examined teacher help seeking. In Study 2, 271 Israeli teachers completed a new measure of Achievement Goals for Teaching Measure, measures of perceived school mastery and ability goal structure, and perceived peer support, and reported how often they had sought help for various problems with teaching. Results confirmed that perceived school emphases on the importance of teacher learning and development enhanced help seeking by enhancing mastery goals for teaching and perceived emphases on teachers' ability and achievement relative to others undermined self-reported rates of help seeking by enhancing teacher ability-avoidance goals. Perceived peer support and cooperation also predicted help seeking. Thus, schools that emphasize relative ability and interpersonal competition make for reluctant help seekers and schools that value learning and cooperation with peers enhance help seeking among teachers, as among students. I shall conclude by discussing implications for theory and research on student and teacher motivation and help seeking and for educational policy.

Modeling and tutoring help seeking with a cognitive tutor
Bruce McLaren, Competence Center for e-Learning, *Germany*
Ido Roll, Carnegie Mellon University, *USA*
Vincent Aleven, Carnegie Mellon University, *USA*
Kenneth Koedinger, Carnegie Mellon University, *USA*

Our research tests the hypothesis that computer-based tutoring of students' help-seeking skills helps them learn to be better help seekers, which in turn helps them to learn targeted cognitive skills more effectively. We have explored this hypothesis in the context of Cognitive Tutors, a learning technology that has been shown to improve students' learning in a variety of domains. We created a detailed model of help-seeking behavior, implemented by means of production rules, that forms the basis for the Help Tutor, a Cognitive Tutor that provides guidance on students' meta-cognitive behavior. The Help Tutor serves as an adjunct to a regular Cognitive Tutor. Students working with the Help Tutor receive tutoring both on domain-specific skills, in this case, geometry problem solving, and help-seeking behavior. To test whether the Help Tutor is effective, we conducted an experiment involving 60 students and performed four analyses. First, we found evidence that the Help Tutor's meta-cognitive model adequately captures adaptive help-seeking behavior and help-seeking errors. Second, we found that the help-seeking behavior of students who worked with the Help Tutor was better (i.e., conforms more closely to the model) than that of students who did not work with the Help Tutor. Third, we found no statistically significant difference between those students who used the Help Tutor and those who didn't with respect to learning of geometry problem-solving skills. Finally, we found no evidence that students' help-seeking behavior improved over time as a result of the Help Tutor's guidance. Thus, while the experiment provides evidence that the Help Tutor captures some aspects of help-seeking behavior, it did not confirm the hypothesis that students become better help seekers and better learners as a result of the Help Tutor. In a new study, we will attempt to improve the meta-cognitive support provided by the Help Tutor.

Help-seeking in the zone of available assistance
Rose Luckin, University of London, *United Kingdom*

The Zone of Available Assistance (ZAA) describes the variety of qualities and quantities of assistance that need to be available to learners and teachers within an educational context. But what factors influence the ways in which learners seek and select help from what is available? We know from the work of Wood and Wood (1999) that the accuracy of learners' decisions about their need for help can be linked to their prior knowledge of the particular domain. This talk will draw upon subsequent work that offers evidence to support the importance of learner metacognition, the social context, learner goal orientation and to the help-seeking behaviour of learners.

Embedding collaborative inquiry learning environments in differently structured classroom scripts: effects on help-seeking processes and learning outcomes
Kati Makitalo-Siegl, University of Munich, *Germany*
Carmen Kohnle, Kaufmannischen Schule Hechingen, *Germany*
Frank Fischer, University of Munich, *Germany*

Collaborative inquiry learning is seen as a student-centred approach which gives more responsibility to learners for regulating their learning processes. Recent research has repeatedly pointed to two problems for realizing collaborative inquiry learning in the classroom. On one hand, it has been demonstrated that students often refuse to seek help from their peer learners as well as from their teacher when conducting typical inquiry like hypothesis formation or data interpretation. On the other hand, it is yet unclear how phases of collaborative inquiry learning should be embedded in the overall classroom setting. The aim of the study is to investigate what effects a collaborative inquiry learning environment would have under conditions of a low vs. a high structured classroom script on learning outcomes and help-seeking processes. 32 students from a secondary school participated in this study. They worked in dyads on a physics module of the Web-based Inquiry Science Environment (WISE). Both quantitative and qualitative analyses were conducted. Although there were no significant differences between the students' domain-related learning outcomes in the high or the low structured script classroom conditions, we found significant difference between the two conditions in seeking help from the teacher. Students with the low structured classroom script sought help from the teacher more often than students with the highly structured script. In addition, two case analyses show that more successful learners sought help from the teacher earlier and for different reasons (e.g. less technology-related questions) than less successful learners. Results are discussed with respect to research on help seeking and collaborative inquiry learning.

E 13
29 August 2007 14:30 - 16:30
Room: Harmónia
Symposium

Learning to write and writing to learn: Effects of learning environment and individual writing style

Chair: **Rainer Bromme,** University of Münster, *Germany*
Chair: **Gert Rijlaarsdam,** University of Amsterdam, *Netherlands*
Organiser: **Rainer Bromme,** University of Münster, *Germany*
Organiser: **Gert Rijlaarsdam,** University of Amsterdam, *Netherlands*
Discussant: **Hein Broekkamp,** University of Amsterdam, *Netherlands*

A great deal of research on the learning and teaching of writing, and on effects of writing on learning, implicitly assumes that writing is a unitary process. Effects of writing instruction are typically assessed in terms of whether they lead to improvements in the global quality of writing, and effects of writing on learning are typically assessed in terms of its overall effect on a single learning outcome. Our aim in this symposium is to explore variability in the effects of different forms of writing instruction and in the effects of writing on learning. The contributions will explore a range of different sources of variability - including learner characteristics, forms of writing task, and interactions between components of the writing process – as well as variation in the effects of writing on learning, including the quality of ideas, of content knowledge and of written text. Galbraith et al. will present a study on the effects of learner characteristics and learning conditions on the development of conceptual coherence through writing. Kieft et al. will investigate whether different forms of writing instruction have differential effects depending on learner characteristics. Braaksma et al. will describe the effects of different forms of writing (hypertexts versus traditional linear texts) on writing process, domain knowledge, text quality, knowledge of writing, and self efficacy, showing that the effect of learning condition interacts with learner characteristics. Schulte-Lßbbert et al. will report the effects of stimulating reflection about different aspects of the communicative situation on the processes involved in revising and the resulting effect on text quality. Hýbner et al will explore how the effects of metacognitive prompting on the writing of learning journals vary with time. The implications for learning and teaching of writing and for the use of writing as a tool for learning will be discussed.

Constructing knowledge objects though writing
David Galbraith, Staffordshire University, *United Kingdom*
Mark Torrance, Staffordshire University, *United Kingdom*
Jenny Hallam, Staffordshire University, *United Kingdom*

This paper describes the results of an experiment designed to test a dual-process model of writing, which suggests that the development of ideas in writing depends on an interaction between two distinct types of process: explicit planning and spontaneous text production. 96 undergraduates, divided into two groups of low and high self-monitors, were asked to write under one of three different conditions: (i) a rough draft condition; (ii) a planned essay condition; and (iii) a control condition. Participants were asked to generate lists of ideas before and after writing, and to compare the ideas they contained. This enabled us to calculate the extent to which they had developed new ideas through writing. They were also asked to rate the degree of relationship

between ideas within the lists produced before and after writing. This enabled us to calculate a measure of conceptual coherence and to assess the effect of different forms of writing on it. The results for new ideas replicated those of previous research, with low self-monitors producing a greater number of new ideas after writing rough drafts than high self monitors, but a similar number of new ideas after writing planned essays. Despite the similar number of new ideas produced in the planned essay condition, however, the ideas produced by low self-monitors were significantly more coherent than those produced by high self-monitors. Furthermore, there were highly significant negative correlations between number of new ideas and conceptual coherence for both the low and high self-monitor's planned essays. We will argue that these results (i) support the claim of the dual process model that dispositionally guided text production leads to more conceptually coherent ideas than rhetorical planning, and (ii) suggest that immediate changes in conceptual coherence as a consequence of writing are restricted by the limited capacity of working memory.

Increasing the effects of writing-to-learn: Adapting a writing course to students' writing strategies
Marleen Kieft, University of Amsterdam, *Netherlands*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Huub van den Bergh, University of Amsterdam, *Netherlands*

In this presentation, we propose to link the study of writing-to-learn to the theory of Aptitude-Treatment Interaction (ATI). In an experimental study we examined the effects of a course 'Writing-to-learn about literary stories' consisting of writing tasks adapted to either a planning strategy, or a revising writing strategy. We hypothesized that the effects of writing-to-learn tasks depend on the interaction between students' preferred writing strategy and the type of writing instruction, matching or mismatching students writing strategy. Our ATI-hypotheses were mainly confirmed: Results indicate that adapting writing tasks to students' writing strategies increases their learning in the field of literature.

Writing hypertexts versus linear texts: Learning and transfer effects
Martine Braaksma, University of Amsterdam, *Netherlands*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Tanja Janssen, University of Amsterdam, *Netherlands*

Introducing hypertext writing at school might have beneficial effects on learning outcomes in two respects: (a) acquisition of writing skills and (b) acquisition of content knowledge. To study these assumptions, we set up an experiment in which 200 participants (tenth grade) followed an extensive lesson series in argumentative writing in which they wrote an essay in hypertext form (experimental group) or in linear form (control group). Pre-tests (aptitude, computer skills, content knowledge, knowledge about writing, and self-efficacy for writing) and post-tests (content knowledge, knowledge about writing, self-efficacy for writing, and quality of a linear text) were administered. During the lesson series, measurements of self-efficacy for writing were performed as well. We will focus on the effects from hypertext writing on writing (text quality of the linear text, knowledge about writing, writing processes) and content knowledge. Furthermore, we will compare the development of self-efficacy for writing (pre-test, implementation measurements, and post test) in the two conditions. Results indicate that the hypertext condition affected the writing process of some typical writing styles, and the domain knowledge.

Metacognitive reflection and revision: The impact of audience awareness and content
Petra Schulte-Löbbert, University of Münster, *Germany*
Rainer Bromme, University of Münster, *Germany*
Regina Jucks, University of Münster, *Germany*

We will present a computerized tool (CRT) that supports a writer's metacognitive reflection about her/his written text and thereby fosters the revision process. Working with the Concept Revision Tool (CRT) includes three main phases: (1) writing a first draft, (2) metacognitive reflection of used concepts, and (3) revision of the text. Stage 2 is in the centre of attention. Here, the CRT analyzes written texts by spotting out central terms (based on a database which is set up a prior by the researcher) and reflects them to the writer by asking pointed questions about these concepts. By selecting the dimensions of reflection about concepts (for example reflection about the concepts' comprehensibility for a certain audience or about their importance for conveying a certain message), the CRT can be used to study those variables which might impact on text revision. We will report results from a first experiment testing two of such dimensions. Research on revision considers audience awareness and the content itself as important variables with an impact on revision. Hitherto, research is missing that compares these two dimensions directly. In our study, n = 30 biological experts worked with the CRT and answered to a fictitious layperson via email. We manipulated the pointed questions in the reflection phase. For half of the participants, the CRT fosters audience awareness (audience focus condition); the other half was focused on the content (content focus condition). Results indicate that in the audience focus condition, experts spent more time on revising, produced longer texts and did more meaningful changes than experts of the content focus condition. Results are discussed with respect to future implications of the CRT and its potential for studying the revision process.

The pitfalls of overprompting in writing-to-learn with new media
Sandra Hübner, University of Freiburg, *Germany*
Matthias Nückles, University of Göttingen, *Germany*
Alexander Renkl, University of Freiburg, *Germany*

Learning protocols are a promising follow-up course work. A learning protocol is a written explication of one's learning processes and outcomes. Experimental studies show that prompts are an effective way to stimulate beneficial cognitive and metacognitive activities in writing learning protocols. To investigate the long term effects of prompting learning protocols, we conducted a longitudinal study. Students wrote a learning protocol about each weekly seminar session over a whole term. They interacted with a web-server to administrate their learning protocols. The server provided the students with different instructions. The experimental group received a combination of cognitive and metacognitive prompts that had proved to be most effective in our experimental studies. The control group received a rather non-specific instruction for writing their protocols (no-prompts condition). The data analyses revealed a significant interaction between measurement time and experimental condition on different levels of analysis: The experimental group outperformed the control group regarding learning success when measured after the first half of the term. When learning success was measured again at the end of the term, the experimental group performed no better than the control group. In the beginning of the term, the prompts effectively stimulated beneficial learning activities in the students' learning protocols. Towards the end of the term, however, the students apparently felt more and more restricted by the prompting instruction. Accordingly, their effort to elicit cognitive and metacognitive activities decreased resulting in a substantially lower learning success. In summary, these results impressively demontrate the pitfalls of prompting procedures in writing-to-learn. It will be discussed how

adaptive instructional support could be designed that avoids the motivational and cognitive pitfalls of such overprompting. In particular, a gradual fading of the prompts might offer a possible solution.

E 14
29 August 2007 14:30 - 16:30
Room: 0.81 Ortvay
Symposium

University teachers' conceptions of relations between teaching and disciplinary research

Chair: **Jan van Driel,** Leiden University, *Netherlands*
Organiser: **Jan van Driel,** Leiden University, *Netherlands*
Organiser: **Jan Elen,** Katholieke Universiteit Leuven, *Belgium*
Organiser: **Sari Lindblom-Ylänne,** University of Helsinki, *Finland*
Discussant: **Lynn McAlpine,** McGill University, *Canada*

Scientific and educational relevance The nexus between teaching and research is a recurrent issue in higher education which gained renewed attention in Europe under influence of the Lisbon agenda and the Bologna process. In this context, the League of European Research Universities (LERU) was founded in 2002 to safeguard Europe's pre-eminent position in basic academic research, among others by strengthening the teaching-research nexus in the educational programmes they offer. Since the way academics perceive this nexus informs their approach to teaching, it is important to investigate their conceptions of teaching, disciplinary research and knowledge in relation to each other. This symposium brings together the results of four empirical studies on university teachers' conceptions of these issues. In previous research it was found that academics perceive a strong link between research and teaching as an essential part of their job satisfaction (Jensen, 1988). Robertson and Bond (2001) found that the epistemological framework of academics determined their approaches to research, learning and teaching. In this context, they identified disciplinary differences related to research traditions and teaching approaches. The studies in this symposium build on this previous research by exploring academics' conceptions of the relationship between teaching and teaching in research intensive universities, all members of LERU, comparing these conceptions over various countries and different disciplines. To broaden the scope, these studies will be discussed from a North American perspective. Aims of the symposium By focusing on academics' perceptions of the connection between teaching and disciplinary research, this symposium aims to provide insights into how they make sense of this relationship and how it shapes their approach to (regulation of) teaching. Since academics have a direct impact on student learning, these insights are essential for policy makers and trainers in the context of strengthening the teaching-research nexus in university education.

The influence of the programme level on the implementation of the teaching-research nexus
An Verburgh, Katholieke Universiteit Leuven, *Belgium*
Jan Elen, Katholieke Universiteit Leuven, *Belgium*

The nexus between teaching and research is a recurrent issue in higher education. Although a widespread belief of a positive nexus exists, the empirical evidence of a correlation between

teaching and research is limited. In addition, little research is conducted on the characteristics of teaching when a nexus is attempted. This study investigates the perceived importance of the nexus and different forms of appearance of the nexus, with a special attention of the teaching characteristics and the influence of the programme level. For the study 54 faculties of 7 universities of the League of Research Intensive Universities (LERU) were interviewed. The results indicate that nexus is experienced as important and very suitable for the development of a mature epistemological disposition of 'critical thinking' among students. A different approach to teaching between bachelor and master programs was found. Whereas in the bachelor an instrumental approach seems to prevail, an immersive model is more typical in the master.

The effect of own study experiences and teaching traditions of own discipline on regulation of university teaching

Sari Lindblom-Ylänne, University of Helsinki, *Finland*
Anne Nevgi, University of Helsinki, *Finland*
Keith Trigwell, University of Sydney, *Australia*

The aims of the present study are twofold. Firstly, the aim is to explore variation and dimensions in regulation of teaching in a multidisciplinary university. Secondly, the aim is it to analyse factors related to regulation of university teaching. It is hypothesised that teaching traditions of own disciplines, teaching cultures of the departments and study experiences as students affect regulation of university teaching. Participants of the study were 73 university teachers representing various disciplines, who were interviewed. The results showed that three different groups emerged, which reflected qualitatively different ways to regulate teaching. The first group was entitled Limited self-regulation. Teachers who belonged to this group considered that teaching traditions of their own discipline set frames for development of teaching practices and methods. The second category was entitled Self-regulation as a reaction against own bad experiences. Teachers who belonged to this group expressed a clear choice not to do the same for own students as was done to them when they were students. These teachers reported that they had learned from their bad study experiences and developed teaching practices different from their own university teachers. The third group was entitled Self-regulation as constructing own approach to teaching through reflection. Teachers who belonged to this group had systematically analysed their own study experiences and the traditions of their own discipline and department and developed their own way of teaching through reflection. The results of the study deepen our knowledge and understanding of factors related to regulation of university teaching. The results may be applied in enhancing student learning and the quality of teaching at university. Furthermore, the results provide important information for educational development on how discipline and teaching traditions steer university teaching.

Conceptions of knowledge, research and teaching and their influence on the research-teaching nexus

Gerda Visser-Wijnveen, Leiden University, *Netherlands*
Jan van Driel, Leiden University, *Netherlands*
Antonya Visser, Leiden University, *Netherlands*
Nico Verloop, Leiden University, *Netherlands*

Universities are supposed to be institutes where research and teaching are closely related. Qualitative studies indicate that the belief in a symbiotic relationship is very strong among academics. Disciplinary culture and disciplinary epistemology shape the way academics perceive this relationship, and act in their discipline. Therefore, when looking at how to strengthen the link

between research and teaching it is necessary to investigate academics' epistemological beliefs, i.e. conceptions about knowledge and knowledge-growth. This research project focuses on the research-teaching nexus in a faculty of Arts. The aim was to better understand how academics perceive research, teaching, and knowledge, and how these are related to each other.Thirty academics from the faculty of Arts of Leiden University were interviewed about their conceptions of the different components of the research-teaching nexus. The respondents were selected using 6 different strata to capture all disciplines in the Arts. Their conceptions were investigated using metaphors as these may stimulate people to become aware of their own implicit beliefs and help them to explicate these beliefs. Respondents were encouraged to react on each of the six presented metaphors for each topic. It appeared that there was a great variety in how academics in the Arts perceive knowledge. The continuum ranges from knowledge as existent outside the self, to knowledge as a construction which exists only in interaction. Many respondents referred explicitly to research when asked about knowledge. However, only for some of them knowledge, research and teaching appeared to be an integrated whole.

Scientific research dispositions in research, teaching and learning
Roeland van der Rijst, Leiden University, *Netherlands*
Jan van Driel, Leiden University, *Netherlands*
Jan Kijne, Leiden University, *Netherlands*
Nico Verloop, Leiden University, *Netherlands*

Many research intensive universities are searching for ways to strengthen the link between research and teaching. Understanding differences and similarities between academics' conceptions about what is important in research can help to enhance the linkage. The aim of the present study is to understand the variation in academics' conceptions of scientific research dispositions. Both academics' conceptions of scientific research dispositions of researchers as well as academics' conceptions of scientific research dispositions for students to acquire during their studies were explored. Participants were 23 academics from the faculty of Mathematics and Natural Sciences of Leiden University. Academics varied from post-doctoral researcher to full-professor, and represented various disciplines within Mathematics and Natural Sciences. Six different aspects of scientific research dispositions emerged, which reflect the qualitative variety in which academics conceptualise scientific research dispositions: inclination (1) to know, (2) to share, (3) to be critical, (4) to do, (5) to understand, and (6) to be innovative. Participants put different emphasis within their conception of the most important aspects of scientific research dispositions. A deeper understanding of scientific research dispositions can be used during professional development of academics. The results of this study provide academics with extra knowledge how to stimulate students' scientific research dispositions with various strategies during their courses.

E 15
29 August 2007 14:30 - 16:30
Room: 1.71 Pócza
Symposium

Eye tracking as a means for detailed analyses of multimedia learning processes – Part 2

Chair: **Fred Paas,** Open University of the Netherlands, *Netherlands*
Organiser: **Tamara van Gog,** Open University of the Netherlands, *Netherlands*
Discussant: **Kenneth Holmqvist,** Lund University, *Sweden*

Multimedia learning is defined as building mental representations from materials that involve both verbal (spoken or written text) and pictorial information (static or dynamic visualizations; Mayer, 2005). Many studies on the effectiveness of multimedia learning have been conducted, often inspired by Mayer's cognitive theory of multimedia learning (see Mayer, 2005) and Sweller's cognitive load theory (see Sweller, 2005). However, these studies have mainly drawn conclusions about the cognitive effects of different types of multimedia learning materials based on (transfer test) performance measures, and measures of cognitive load and time-on-task, without directly investigating the processes underlying these effects. Hence, the empirical work presented in this double symposium focuses on detailed analyses of the processes underlying the learning effects of different types of multimedia materials by means of eye tracking. Because eye movement data can provide detailed insight into the allocation of (visual) attention and processing demands, eye tracking is a valuable tool for such studies –albeit one that is little used in educational research. In this double symposium, studies are presented that focus on learning from a variety of multimedia materials that include dynamic visualizations, static visualizations, written text, and narrated text, in varying compositions.

The influence of information relevancy, animation and narration on visual attention distribution: Results from an eye-tracking study
Eric Wiebe, North Carolina State University, *USA*
Leonard Annetta, North Carolina State University, *USA*

Research and application of cognitive load theory has demonstrated the effect of various text/graphic/narration relations on learning using multimedia material. Related work has looked at how the degree of integration between the text and graphics influences their use in learning. This study set out to look at how the degree of integration between text and graphics interacts with graphic dynamics and narration to influence visual attention in multimedia instructional material. Eye tracking methodologies were used to explore how visual attentional resources were distributed under these varying conditions. Narration had a clear effect of "pacing" the viewers of the slide show. Static and animated graphics that were not relevant to the printed text (low integration) favored more gaze time on the text, though narration did tend to shift attention back to the graphic. In addition, animation seemed to create high load conditions that favored students relying more heavily on narration, shifting visual attention away from the text and to the graphic, especially in the high integration condition.

A closer look at split visual attention in system-paced and self-paced multimedia instructions
Florian Schmidt-Weigand, University of Kassel, *Germany*
Alfred Kohnert, Justus Liebig University Giessen, *Germany*
Ulrich Glowalla, Justus Liebig University Giessen, *Germany*

We present two experiments that aimed to take a closer look on split attention demands in multimedia learning by applying eye tracking methodology. In particular we investigated how the pace of presentation and its control affects the allocation of visual attention to dynamic visualizations and accompanying text. Participants watched a 16-step multimedia instruction on the formation of lightning. Besides text modality (written, spoken) experiment 1 (N=90) varied the pacing of instruction (fast, medium, slow) while in experiment 2 (N=31) the pacing was self-paced. In addition to eye movements we recorded cognitive load and learning outcome (retention, transfer, and visual memory tests). Experiment 1 indicated main effects for text modality and pacing in cognitive load and learning performance measures as well as an interaction. Written compared to spoken text increased cognitive load especially in the fast presentation condition. Within written text conditions learners virtually always turned to the text first and then switched back and forth between text and illustration. In relation to the time spent reading more time was spent inspecting the illustrations the longer the presentation lasted. In experiment 2 learning outcomes, self-ratings of cognitive load, and average presentation durations did not differ significantly between written and spoken text presentation. Independent from text modality there were huge inter-individual differences in the chosen pace. For written text presentation eye movement patterns revealed that these differences were essentially due to individual reading speed. The time inspecting illustrations and the number of switches between text and illustration did not vary systematically with pace. These results contrast the findings of experiment 1 where time on illustrations and the number of alternations increased for longer presentation durations. These differences in managing split attention may explain inconsistent effects of text modality in self- vs. system-paced presentation.

The contribution of eye tracking to studying comprehension in learning from animations
Emmanuel Schneider, Universite de Bourgonge, *France*
Jean-Michel Boucheix, Universite de Bourgonge, *France*

This paper aims to present the contribution of the eye tracking investigations for the study of comprehension processing from animated or static illustrations. Currently, comprehension processes are assessed only from off-line comprehension tests. Eye tracking data could bring on-line information about the comprehension processes from animated diagrams in learners with high and low spatial and abilities. In the three studies reported, we tested the role of two factors in the elaboration of an efficient mental animated representation of a three pulleys system: the user-control of the animation and the orientation of attention, with a specific task or with arrows cueing.

Eye tracking as a basis for improving animation design
Ric Lowe, Curtin University, *Australia*
Jean-Michel Boucheix, Universite de Bourgonge, *France*

In this paper we explore the utility of eye tacking indicators such as fixations, transitions between areas of interest and "scan paths" as tools for understanding how individuals extract information from a complex technical animation. We report a series of experiments involving verbal description, the effect of cues on comprehension, and the development of comprehension during the course of the animation. The techniques used in these investigations and their results will be

discussed in terms of the opportunities that eye tracking approaches offer for studying the on-line processes involved in an individual's development of a high quality mental model from an animation. Limitations of using eye-tracking methodologies for such investigations will also be considered and possibilities for complementary approaches explored.

Eye movements of differently knowledgeable learners during learning with split-source or integrated format
Gabriele Cierniak, Eberhard Karls University Tübingen, *Germany*
Katharina Scheiter, Eberhard Karls University Tübingen, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*

The aim of this study is to compare general assumptions about reading different multimedia instructions (labelled pictures in an integrated format vs. split-attention format) with eye-tracking data from learners' actual reading behaviour. Theoretical assumptions from multimedia and cognitive load research about the way learners visually process physically integrated and split-attention instructions of labelled pictures are investigated empirically. Eye-tracking is used to empirically identify different processing strategies. Furthermore, it is tried to relate the effects of visual attention allocation on learning outcome. Eye movement data of the first participants were analysed so far in three different ways: the amount of time spent on text vs. picture areas, the oscillation rate between text and picture information and the linearity of processing. Prior knowledge is considered to influence the reading pattern and learning outcome. The first results show that the empirical data confirm some of the theoretical assumptions.

E 16
29 August 2007 14:30 - 16:30
Room: 0.79 Jánossy
Symposium

Relations between external and internal knowledge representations in mathematics learning

Chair: **Michael Schneider,** ETH Zurich, *Switzerland*
Organiser: **Michael Schneider,** ETH Zurich, *Switzerland*
Discussant: **Daniel Ansari,** University of Western Ontario, *Canada*

Many key theorists in psychology, among them Newell and Simon, Piaget, and Vygotsky, have emphasized the general importance of knowledge representation. Representations facilitate the stability of knowledge over time and across different situations, both in individuals and social communities. However, they also allow for dynamic transformations of knowledge. The respective structure of a representation guides attention. It eases certain actions and inferences, while it aggravates others (i.e., affordances and constraints of representations). In research on mathematics learning, cognitive psychologists have focussed predominantly on the roles of internal, that is, mental, knowledge representations, such as conceptual and procedural knowledge, verbal and visual representations in long-time and working memory, and the mental number line. In contrast, pedagogical researchers have investigated more thoroughly the roles of external knowledge representations, like graphs, notational systems for numbers, and symbol systems in general. However, internal and external knowledge representations are not independent of each other.

During learning and problem solving they can strengthen, complement, or hinder each other in different ways. In the symposium we will investigate the roles of external and internal knowledge representations, and, especially, the roles of their interactions in children's mathematics learning. Empirical studies from the domains of numerical estimation, probability theory, graph competence, and understanding of algebraic expressions will highlight aspects of this wide field and elaborate on them with the help of different methodological approaches, such as experimental and developmental designs, eye-tracking, interviews, and path analyses. The discussion will address commonalities and differences of external and internal knowledge representations, the implications of the presented studies from the viewpoints of cognitive science as well as pedagogy, and relations between the two disciplines that became apparent during the presentations.

The role of internal representations of magnitude in numerical estimation
Julie Booth, Carnegie Mellon University, *USA*
Robert Siegler, Carnegie Mellon University, *USA*

This study examined developmental and individual differences in choice of numerical representation for four types of numerical estimation; it also aimed to determine whether these individual differences were related to students' general mathematics ability. Second and fourth grade students completed four different tasks on the 0-1000 scale: number line, measurement, numerosity, and computational estimation. Estimates improved between second and fourth grade for all four tasks. At both grade levels, all types of estimation were consistently intercorrelated, and each was also correlated with individual differences in children's math achievement. In addition, we replicated the previously observed shift between second and fourth grade from reliance on a logarithmic representation of numbers to use of a linear one on the 0-1000 scale, not only on the number line task, but on the measurement and numerosity tasks as well. The three measures of linearity were also related to math achievement, though their intercorrelations remained when math achievement was controlled for. Results from this study suggest that difficulty in choosing the appropriate, linear representation of numbers may explain children's poor performance on a variety of estimation and other mathematics tasks.

Children's access to representations of magnitude and the development of mathematical disabilities
Bert De Smedt, K.U. Leuven, *Belgium*
Ann Swillen, K.U. Leuven, *Belgium*
Lieven Verschaffel, K.U. Leuven, *Belgium*
Pol Ghesquiere, K.U. Leuven, *Belgium*

It has been demonstrated that the speed and efficiency of accessing representations of magnitude is an important determinant of the development of mathematical skills in primary school children. Moreover, recent research suggests that mathematical disabilities (MD) are due to a domain-specific deficit in the speed and efficiency of accessing such magnitude representations of number. The present study examined children's access to representations of magnitude and its relation to mathematical functioning in children with a genetic disorder who are at risk for math disability, namely children with Velo-Cardio-Facial Syndrome (VCFS). Performance of twenty-five primary school children with VCFS was compared with an individually matched control group. A classic number comparison task was administered to measure children's access to representations of magnitude. All children completed assessments of various mathematical abilities (single-digit arithmetic, multidigit arithmetic, word problem solving). A number reading task was administered

as a control measure. Children with VCFS were significantly slower in accessing magnitude representations from symbolic number, as evidenced by slower performance on number comparison. This difference could not be attributed to a slower number identification as children with VCFS did not differ from controls in number reading. Children with VCFS also performed significantly slower on single-digit addition and subtraction and were significantly less accurately in solving multidigit calculations and word problems. Number comparison was related to most of the response time data on the other math tasks in children with VCFS. These associations were particularly prominent for single-digit addition and subtraction. To conclude, the speed of accessing magnitude representations appears to be an important correlate of the development of MD in children with VCFS. Therefore, these children may benefit from educational interventions that foster the development of magnitude representations.

Students' interpretations of algebraic expressions in inequalities
Konstantinos Christou, University of Athens, *Greece*
Stella Vosniadou, University of Athens, *Greece*

In this paper we present results from a study which investigated students' interpretations of algebraic expressions and their effects on evaluating algebraic inequalities. Algebraic expressions use literal symbols to stand for numbers and in that way they can be considered as external representations. We adopt a constructivist position to analyse how the individuals interpret external representations. More specifically, we argue that the individuals understand external representations on the basis of what they already know. If so, prior knowledge about natural numbers can hinder students' understanding that a literal symbol in algebra can stand for any real number. The study was based on individual interviews with 10th grade students who were asked to test the validity of six algebraic inequalities. The results showed that none of the students used the formal way of solving an inequality. Instead, all students substituted numbers for the literal symbols in order to test whether the inequality was valid or invalid. The majority of the students' responses (60%) substituted only natural numbers for the literal symbols. In those cases students came up with erroneous responses concluding that the inequality was either valid or invalid for any number in all cases where the inequality was valid or invalid respectively for natural numbers. Another 28% of the students' responses substituted integers for the literal symbols. In those cases students came up with the erroneous conclusion that the given inequality was valid for positive numbers and invalid for negatives or vice versa. Only 12% of the students' responses substituted rational numbers for the literal symbols. These results are consistent with previous findings and support our hypothesis that students' prior knowledge of natural numbers affects the way they interpret the algebraic expressions and this reflects on their performance in mathematical tasks such as the evaluation of algebraic inequalities.

Multiple external representations and internal representations: Why subjective goals matter!
Alexander Renkl, University of Freiburg, *Germany*
Rolf Schwonke, University of Freiburg, *Germany*
Kirsten Berthold, University of Freiburg, *Germany*

An (often implicit) assumption of educational and psychological laypersons as well as researchers in these fields is that there is a relatively direct correspondence between externally provided representations (e.g., as learning materials) and internal representations. Against this background multiple external representations are often regarded as facilitating learning and leading to multiple internal representations. For example, the theory of Päivio suggests that pictures lead to internally represented imagens and language leads to logogens. Although the different subsystems containing

imagens and logogens can interact they remain separated systems. In this contribution, we will argue that there is less of a one-to-one-correspondence than it is often assumed and, above all, that the subjective learning goals determine which effects result from the provision of external representations. Therefore, the instructionally intended functions of external representations often do not come into play and do not lead to the intended type of internal representations. We formulate five theses on the influence of interindividual difference and instructional factors that moderate the effects that multiple external representations have on internal representations and learning. These theses will be backed-up by findings from studies on learning probability from worked-out examples containing solutions in multiple representations. Evidence provided by different data collection methods such as eye-tracking, stimulated recall, written self-explanation data, and learning outcome(s) tests "triangulate" our assumptions.

E 17
29 August 2007 14:30 - 16:30
Room: 0.99
Symposium

Peer talk and peer learning in first and second language

Chair: **Ageliki Nicolopoulou,** Llehigh University, *USA*
Organiser: **Shoshana Blum-Kulka,** Hebrew University, *Israel*
Discussant: **Ageliki Nicolopoulou,** Llehigh University, *USA*

The question of how social interaction affects the process of discourse development has attracted researchers' attention from various disciplines for over thirty years. It has yielded a wealth of information on how adult-child talk in two-party or multi-party structures enhances language learning, as well as on how children's engagement in interactional practices involving children and adults together, helps them become members of their culture. Nevertheless until recently it no due attention has been paid to children's natural peer talk. The goal of the symposium is to restore the balance by exploring the value of naturally occurring peer interaction to the development of discourse skills in first and second language. The symposium convenes scholars from different countries (USA, Italy, Norway, Sweden and Israel), engaged in theoretical and empirical study of children's peer interaction to explore how children are socialized into appropriate language use and cultural membership in first and second language through peer interactions. The symposium will focus on questions related both to second and first language learners, such as the types of opportunity spaces for language learning provided by native-nonnative interactions in the preschool, the contribution of second language learners out-of-frame talk to their language development, and the "teaching" role of spontaneous language drills; peer talk and pragmatic development in fist language, exploring questions such as the unique nature of socio-cultural learning provided by peer interactions in different cultures, the role of small group class discussions in enhancing explanatory thinking and the specific contributions of pretend play to language learning. Discussion will center on the overall social and discursive gains of peer interaction and the educational implications thereof for the organization and practices of early education for both native and immigrant children.

Language drills as peer-group L2 "teaching". On vocabulary training and identity work in immersion classrooms
Asta Cekaita, Linköping University, *Sweden*
Karin Aronsson, Linköping University, *Sweden*

Work on early second language (L2) classrooms tends to focus on teachers talk rather than on student talk. Our recordings of naturalistic classroom talk in a first grade classroom document ways in which the young children themselves recurrently initiated and engaged in spontaneous language drills. The ethnography draws on video recordings of language lessons in a Swedish language immersion group for recently arrived refugee and immigrant children. Through detailed sequential analyses of teacher- initiated vocabulary teaching routines, it is shown how language drills need not necessarily be "unauthentic" or mechanistic phenomena (for a related critique cf Cook, 2001). Our recordings revealed that the children themselves often initiated language drills in their spontaneous peer group interactions, drawing on them as social and affective resources. During teacher-initiated vocabulary training, the children recurrently tried to outperform each other in being the first ones to display mastery of specific vocabulary items by calling out their responses. Positions in the classroom community were explicitly claimed in that the children recurrently engaged in discourse about their respective grade levels and age. The present interactions were modelled on teacher-fronted self-presentation drills. Yet, the category claims were partly subverted in that the children recurrently exploited joking formats. Simultaneously, such recyclings revealed the children's understanding of the local norms of school culture. In line with theorizing on language socialization practices, (e.g. Ochs, 1992), indexical use of language features stances and acts through which social activities and identities are co-construed. The present data show ways in which peer play simultaneously involves L2 pragmatics and identity work, more precisely the local construction of a classroom community.

Second language learners' out-of-frame talk in peer pretend play
Veslerney Rydland, Oslo University, *Norway*
Vibeke Aukrust, Oslo University, *Norway*

Much research has pointed to the importance of out-of-frame negotiations in peer pretend play for preschool children's social, cognitive and literacy development. Few studies have, however, investigated the longitudinal relations between out-of-frame talk in preschool and children's oral-language skills when entering school, or the pragmatic language competencies second-language learning children have to draw upon to be involved in this planning and negotiating phase of play. In this study, a group of children, who had Turkish as their first language and Norwegian as their second language, was followed for two years, from preschool to first grade, and videotaped in play with peers. First, relations between out-of-frame talk in preschool and vocabulary skills in first grade were investigated. Second, the analysis focused on how children developed in regulating their peers through addressing and opposing others in out-of-frame negotiations. The main findings indicate that out-of-frame talk in the preschool years explained variance in oral-language skills in first grade, and that these second-language learners developed to increasingly address and oppose their peers over this two-year period.

Peer talk as cultural practice and a matrix for the development of discursive skills.
Rebecca Sutherland, Harvard University, *USA*
Shoshana Blum-Kulka, Hebrew University, *Israel*
Catherine Snow, Harvard University, *Israel*

How do children in different cultures use peer talk for language learning and to become members of their own culture? We studied these questions by comparing the genre repertoire of natural peer talk of American and Israeli preschool children from a context and culture sensitive approach. Applying a four-dimensional discourse-analytical model to large samples preschool children's spontaneous talk in the two cultures, we sought to explore, from a cross-cultural perspective a) variation in types and functions of genres and sub-genres used b) the emergence of "conversation", namely non-instrumental, out-of-play talk and c) the emergence of genres of extended discourse. The discursive resources evoked in the children's talk were captured by segmenting the data into thematic episodes, and noting for each its dominant genre and types of keying (e.g. like pretend/non-pretend). The preschoolers' peer talk discursive repertoire in both cultures was found to be surprisingly rich in different genres. The most common types of discourse in both American and Israeli preschool are activity talk and play talk, but the children were also observed to engage in sociable, non-activity focused talk and in the co-construction of genres of extended genres, like narratives and explanations. Cultural ways of speaking emerged primarily in modes of involvement in sociable talk. Peer talk emerges as allowing for an apprenticeship in culture and conversation in several ways –in promoting discursive skills, in enhancing the understanding of functions of talk and language at large, and as a site for enculturation.

Pretend play in the wake of story reading: An opportunity for literacy enhancement
Eva Teubal, David Yellin Teachers' College, *Israel*
Esther Vardi-Rath , Kay Teachers' College, *Israel*
Tamar Eylon, Kay Teachers'College, *Israel*
Zehava Cohen, Kay Teachers' College, *Israel*
Teresa Lewin, Kay Teachers' College, *Israel*
Hadassa Aillenberg, Kay Teachers' College, *Israel*

Children's peer discourse has been found to scaffold discourse abilities in general as well as encourage the emergence of various genres of literate discourse (Blum-Kulka & Snow, 2004). The aim of this three year study was to analyze children's pretend play discourse after they had been read a story. The questions to be addressed in this symposium deal with the impact of the read story text upon children's re-creation of that story when they engage in pretend play in the wake of the story. a) What is the degree of awareness of the given story text revealed by the children's discourse? b) To what extent do children expand the story text? The children played for about twenty minutes. The coding scheme used in this analysis consisted of categories focused on the children's attitude to the story text during the "story playing session": 1) awareness of the story text- adhering to text, expanding text, metacognitive attitude to text - .this includes play behavior according to the text, as well as behavior altering the text (introducing additional characters, for example) while still taking it into account and maintaining the frame of the story. 2) Ignoring the story text- children depart from the frame of the story. ost of the children's discourse reveals awareness of the story text (82%). Children's pretend play in the wake of a story read to them is an activity with great potential for learning from and about texts within a context which is relevant and authentic from the children's point of view.

Thinking aboput history in small groups pf 4th grade Italian children
Camilla Monaco, Universita La Sapienza, *Italy*
Clotilde Pontecorvo, Universita La Sapienza, *Italy*

According to some authors, the ability of thinking "in historical terms" is mainly based on the process of explanation and explaining is a social activity, since people explain something to someone in order to obtain an effect. Primary school can be an important context for the development of this kind of ability: it offers a range of educational situations, such as discussion between peers, particularly useful for facilitating children's explanatory abilities. This research aims at understanding how discourse about historical topics moves and develops into a specific interactional context: the small-group activity. Ten small autonomous groups (ranging from three to five participants) of 4th grade children, that belonged to two different Italian primary classrooms, were invited to discuss about an iconographical document, starting from some questions concerning the document itself, in order to reach a shared answer of the group's participants. Qualitative analysis of interactions within the groups shows that peer talk is an important tool for the development of explanatory reasoning: working together with a common aim enables children to discuss, cooperate and, sometimes, conflict with equally competent partners. In these situations, children are able to "think together", to reason effectively, to make hypotheses and negotiate old and new conceptual meanings, even though they do not feel fully confident about their own ideas.

E 18
29 August 2007 14:30 - 16:30
Room: 0.100B
Symposium

The potential of argumentation and enquiry based technological environments in learning sciences

Chair: **Baruch Schwarz,** the Hebrew University, *Israel*
Organiser: **Baruch Schwarz,** the Hebrew University, *Israel*
Organiser: **Nathalie Muller Mirza,** University of Neuchatel, *Switzerland*
Discussant: **Andree Tiberghien,** University of Lyon 2, *France*

Both argumentation and enquiry strategies have recognized to be potentially helpful for learning scientific concepts. In argumentative activities, students are discussing scientific issues collectively and in this way find out they can formulate arguments on scientific issues, build explanations and learn to distinguish between essential and non essential observations. They also become aware of different opinions and perspectives, they use different ways to plan an analysis or an experiment and they learn the use of fundamental terms in science, such as hypothesis, hypothesis-testing or scientifically grounded arguments. Enquiry Based strategies reflect a constructionist approach: learning is apprehended as a construction and an "instrumentalization". However, argumentation and enquiry based strategies often do not lead to learning gains, partly because argumentation and enquiry pertain to different phases of scientific activity and because it is difficult to elaborate suitable environments that integrate these phases in school. The present symposium gathers scientists that used a technology based environment that integrates argumentation and enquiry. For argumentation, students used a graphical tool with which

synchronous discussions are gradually represented and can be reflected on. For the enhancing of enquiry, "Microworlds" are designed and tailored for specific uses, and allow students to change, for example, the initial conditions of a physical phenomenon, isolate a specific factor and see how it influences a certain physical procedure. In that sense, students experiment to define the physical laws that dominate phenomena. They can use trial and error methods to examine "what will happen if…"situations, and they can transform the environment "so that … will happen", etc. In this way students can test their hypotheses and discuss the most viable one. The participants in this symposium have all designed and developed a number of suitable educational cases. Each of the participants will focus on different issues concerning experimentation and learning processes.

Critical factors for productive processes of enquiry based dialogs
Baruch Schwarz, the Hebrew University, *Israel*
Haim Penso, the Hebrew University, *Israel*
Yaron Schur, the Hebrew University, *Israel*

Fostering concept learning in science education is a very difficult endeavor. The models proposed (e.g., the cognitive conflict paradigm) lead to dubious results if educators confine their efforts to a pure cognitive perspective (e.g., bringing anomalous data). We present here the idea that led to the elaboration of the ESCALATE project that provides a rich environment for fostering concept learning in science education. The implementation of activities in school led to successes and failures, as it happens in research design. We capitalized on this experience to redesign the environments and to identify critical factors for productive processes of enquiry based dialogs.

Evaluating students' argumentation as they use Digalo in science
Sue Johnson, University of London, *United Kingdom*
Shirley Simon, University of London, *United Kingdom*

This paper reports on the use of the graphical tool, Digalo, which enables students' argumentative discussions on scientific issues to be represented, reflected upon and evaluated by teachers and students. The research focuses on the use of evaluative tools to analyse the process of argumentation and its outcomes, through examining argumentation as students engage in oral discussion and the argumentative maps created through sessions on Digalo. The research also aims to find ways of sharing the process of evaluation with teachers and students, and to examine how they conduct their own evaluations. The outcomes of the research will inform the pedagogy of argumentation in science and enhance our understanding of the potential of using e-learning environments in promoting students' epistemic understanding.

Intuitive ideas and scientific explanations as part of elementary children's developing understanding in astronomy: the case of the seasons
Valerie Tartas, University of Toulouse 2, *France*
Valerie Frede, University of Toulouse 2, *France*

The present research relies on a developmental study in a socio-cultural perspective where the pupils (in grade 3 and in grade 5 in the elementary school) are invited by their teacher to answer the following question: why are there seasons? The situated activity in school is studied rather than the children's answers to a questionnaire as frequently used in developmental psychology (for example, Vosniadou & Brewer, 1994). In order to allow the pupils to explain in a scientific way such a phenomenon, the teachers have developed different phased activities where the tools proposed and the social configurations of activity vary. In these different phases, two specific

activities have been conducted: a debate supported or not by a computer tool called Digalo which allows the construction of argumentative maps and an inquiry-based activity (as for example the construction of a model of the system "Earth and Sun" in order to simulate their movements to explain why there are seasons). We expect these two kinds of activities to offer an opportunity to enhance the pupils' scientific reasoning. The unit of analysis is the level of explanation used by the pupils through the different phases of the activity (pre-test; small groups activity, collective debate activity, modelling activity or working on the argumentative maps constructed by other pupils) and its development in the course of the phased activities. The analysis focuses firstly on the different kinds of hypotheses co-constructed by the children, secondly on the formulation they used in order to expose their hypothesis to the others, and thirdly, on its evolution through the debate and after the modelling activity. The discussion will explore the role of the different dynamics at stake in the collective activities which could sometimes open opportunities to learn.

How improving scientific learning through argumentation? The example of an argumentative design mediated by Digalo
Nathalie Muller Mirza, University of Neuchatel, *Switzerland*

This paper presents a pedagogical scenario where argumentation and a technological environment are used as learning tools (Digalo). It takes a socio-cultural perspective, giving thus a central role to interaction and symbolic and social mediation in development and learning processes. In scientific domain, it is now recognized that argumentation, under certain conditions, helps pupils to elaborate scientific concepts from everyday representations. By justifying and negotiating their point of view on a phenomenon, through the confrontation with other positions, they are lead to identify epistemological obstacles and construct new knowledge. But setting up argumentative activities that allow cognitive gains in classroom is not an easy matter. In this perspective technological environment can be useful in order to sustain argumentation and to "keep track" of the discursive processes. The pedagogical scenario mediated by "Digalo" that will be presented in this paper has been set up in an education framework. The scenario topic concerns the cell and more specifically the Euglena cell. The learners are asked to take part in a phased argumentative activity involving readings and analysis of textual resources, discussions into small groups and debating through Digalo. In this paper we shall analyze and present the results of this test. In particular we'll show that pupils knowledge in biology concepts evolves. But more interesting, it seems that cognitive and argumentative processes are interconnected. It means that in articulating and making reference to arguments that other participants have formulated learners develop new understanding about the scientific content. The limits of the scenario and of this kind of pedagogical activities will also be discussed. A grid of analysis focusing both on products (argument) and on processes (argumentation) will be presented. The final discussion will raise theoretical and methodological issues in education that the results tackle.

Using computer supported enquiry within sequences in physics (Marbles Moves): which learners' representations and problems solving strategies changes are fostered?
Alaric Kohler, University of Neuchatel, *Switzerland*
Pascale Marro, University of Neuchatel & Uni of Teacher Education, *Switzerland*
Stephane Sugnaux, University of Teacher Education, Fribourg, *Switzerland*

This presentation aims at analysing cognitive, interactive and pedagogical consequences of using virtual simulative (microworld) and argumentative (Digalo) tools in science classroom. It takes part of ESCALATE European project. Our approach takes place in psychosocial stream, which puzzle about relationships between individuals, knowledge objects, situation and mediation tool.

In this field, results accumulated over the last twenty five years showed that individual actions and enunciations solving a problem do not express only data processing operative mechanisms, but rather interpretative processes about various situational parameters: "Even if the individual seems to lead on his own the sense making, no one can succeed without symbolic systems specific to the culture" (Bruner, 1996). Rational stakes of knowledge exist simultaneously with different stakes, social, relational, and depending on constraints, for instance semiotic. More precisely, our study analyses individual or social processes happening during the construction of a representation and a solution to physics problems. A simulative situation, called Marbles Moves, is presented to children (13 years old) and young adults (16-17 years old), for them to manipulate variables and understand various physics notions. Sequences analysis allows us to stress various "profiles" according to the task representations and problem solving strategies. It is noticeable for some of these results how much they are directly bound to the mediation tool.

E 19
29 August 2007 14:30 - 16:30
Room: Konferencia
Symposium

Early modern foreign language programs: processes and outcomes

Chair: **Marianne Nikolov,** University of Pécs, *Hungary*
Organiser: **Marianne Nikolov,** University of Pécs, *Hungary*
Discussant: **Helena Curtain,** Univesrity of Wisconsin Milwaukee, *USA*

Recently a worldwide increase has been documented in early foreign language programmes based on claims of the Critical Period Hypothesis (CPH) and “the earlier the better” slogan. State-of-the-art reviews (e.g., Johnstone, 2002; Kubanek-German, 1998; Nikolov, 2002), international comparisons (Nikolov & Curtain, 2000; Nikolov & Mihaljevic Djigunovic, 2006), conferences and language policy documents indicate that despite the “questionable impact” (DeKeyser & Larson-Hall, 2005, p. 101) of CPH-related discussions, there is an enormous interest in early programmes. The aim of the symposium is to discuss some important issues emerging from recent research (e.g., Blondin, Candelier, Edelenbos, Johnstone, Kubanek-German & Taeschner, 1998; Edelenbos & Johnstone, 1996, Moon & Nikolov, 2000) by examining processes and outcomes in four European contexts: Ireland, Croatia, Hungary, and Poland. John Harris’s paper examines the experiences and attitudes of Irish pupils to learning a second indigenous language, Irish, and a third foreign language besides English, their L1. Jelena Mihaljevic Djigunovic presents findings obtained in comparative longitudinal studies on English, French, German and Italian introduced at age 7 in Croatia. Two studies present results on Hungarian language learners: Marianne Nikolov and Krisztián Józsa examine the impact of macro factors on 6th graders’ achievements in English and German, whereas Andrea Orosz zooms in on the relationship between vocabulary learning and frequency and distribution of vocabulary items in teaching materials. Polish teachers of young language learners were involved in a small-scale study conducted by Mariola Bogucka documenting complex ways in which change initiated in European documents is integrated into teaching practice. Although the educational contexts and conditions vary to a great extent, findings of these studies may be relevant for other educational contexts. A special strength of the symposium lies in the variety of target languages and in presenting both longitudinal and cross-sectional research involving both large and small numbers of participants.

Early language learning in Ireland: a comparison of pupil attitude-motivation in relation to learning a minority indigenous language versus one of the main languages of Europe
John Harris, Trinity College Dublin, *Ireland*

Irish, a minority language, is the first official language in Ireland. It has been taught to virtually all primary-school pupils since the foundation of the state about 85 years ago. In the vast majority of cases, it is taught as a second language and as a single school subject in 'ordinary' mainstream schools to pupils whose home language is English. More recently, modern European languages (French, German, Spanish or Italian) have been introduced on a pilot basis to about 10% of primary schools. The present paper examines the experiences and attitudes of pupils to learning these two kinds of languages at primary level in addition to English – a second indigenous language, Irish, and a third foreign (modern European) language. It focuses in particular on the extent to which pupils attitudes reflect (1) the different societal attitudes to indigenous minority languages and to the main languages of Europe and (2) pupils' direct experience of the language learning process. Attitudes are also related to variables such as pupil gender, socioeconomic background, parental support, disadvantage and urban rural location.

Short term and long term effects of early language learning
Jelena Mihaljevic Djigunovic, University of Zagreb, *Croatia*

The impact of the age factor on foreign language learning continues to be one of the most important issues in applied linguistics. It is not only interesting from the theory and research point of view but is highly relevant in a more pragmatic sense as well: it should form the basis for a sound language education policy in any context. This paper will describe findings obtained in comparative longitudinal studies in which four foreign languages (English, French, German and Italian) were introduced at age 7 as part of an early foreign language learning project in Croatia. Data were collected from three generations of young foreign language learners, whose language learning was observed for eight years. Close to 1,000 learners were involved in the project. Control groups were drawn from learners who started foreign language learning at age 10, the usual starting age at the time. Data were gathered by means of observation, questionnaires, oral interviews and language tests. Results on the following aspects of their language learning process will be described: phonological development, morphosyntactic development, speech production, use of learning strategies, use of communication strategies, cognitive and affective learner characteristics. These will be discussed from two perspectives: that of the language learning context (foreign vs. second language context) and from the broader second language acquisition perspective.

Sixth graders' achievements in English and German: a study of macro factors
Marianne Nikolov, University of Pécs, *Hungary*
Krisztián Józsa, University of Szeged, *Hungary*

The paper analyzes a large database collected in an assessment project on Hungarian learners' achievements in the two most widely taught modern foreign languages: English and German. A nationally representative sample of about 10,000 year 6 learners was involved in a survey organized by a satellite institution (OKEV) of the Ministry of Education in May 2003 (Nikolov & Józsa, 2003, 2006) and implemented by the Research Group on the Development of Competencies, Hungarian Academy of Sciences. In the paper we discuss the relationships between learners' achievements and some macro factors influencing them: school type, number of weekly classes, years of language study, students' socioeconomic status, and extra curricular language

study. Then, we analyze how task familiarity and frequency of task type use relate to performances on tests and participants' self-assessment. Finally, we build a model showing how macro variables contribute to outcomes. Findings indicate that the type of school students attend has a strong relationship with their achievements. However, the correlations between weekly hours and years of study show a controversial picture for English and German. A strong relationship was found between frequency of task types and familiarity with them and achievements. A similar relationship characterizes students' perceptions of task difficulty and their performances on them. As for the major argument for early start programmes, the length of language study, correlations with outcomes and year of language learning indicate modest relationships. The strongest relationships were found between school grades and performances, and students' socio-economic status and their achievements on proficiency tests. As regression analyses indicate, parents' educational level and number of weekly classes explain about one third of variance in language achievements in both languages.

Coursebooks' contribution to young learners' English vocabulary size growth
Andrea Orosz, University of Szeged, *Hungary*

This paper aims to describe results of a study that investigates the frequency level, the vocabulary size and re-occurrences in English language coursebooks for young learners. The study compares vocabulary in teaching materials with what students retain. Investigating re-occurrences was essential as new vocabulary fits into students' depth of knowledge by repetition. Repetition should occur very soon after it was first studied and then several times on a regular basis. It is called spaced repetition and it results in depth of knowledge, but masses repetition does not. The research was conducted by counting the words in the books and analyzing their distances from each other. After that 490 pupils (age 9-11) from three average primary schools in Szeged, Hungary were asked at the end of the 2005/2006 academic year to fill in the paper and pencil version of the Swansea X_lex vocabulary levels test (Meara & Milton, 2003). The test is in widespread use and has been shown to give reliable results. It is suitable to measure vocabulary size from beginner to intermediate level. Results show that participants' vocabulary size grows gradually and at the end of the 5th form (age 11) it is around 1,000 words. It is bigger than the indicated vocabulary size in the National Core Curriculum (2003), but if we compare this size with the vocabulary offered in the books the results are less favourable. The research revealed that coursebooks do not give enough opportunities for spaced repetition. Therefore, it is not surprising that even if teachers teach and students learn new vocabulary, learners retain only a small portion.

Can young learners of English in Poland benefit from the Common European Language Policy?
Mariola Bogucka, University of Gdansk, *Poland*

Common European Framework of Reference, European Language Portfolio, 'can-do statements' or 'intercultural awareness' have become buzz words in Poland. However, the key question is how these terms affect teacher training and eventually classroom practice in young learner language education. The research project carried out at Gdansk University attempts to answer the following questions: What is the attitude of young learner teachers to the new concepts? What changes can be introduced in the teacher training programme in order to facilitate the implementation of the new educational policy? To what extent can young learners of English benefit from the common European language policy? The study involves a group of twelve teachers from primary schools. The purpose of the study is to identify the level of knowledge and understanding of the ideas advocated in the European documents and to explore their practical implementation in the classroom. The study uses the multimethod approach: data were collected with a questionnaire,

interviews and lesson observations. The first stage of the study is based on a questionnaire which requires answering both closed and open-ended questions. The closed questions refer to the teachers' teaching contexts, whereas the open-ended questions require reflection on their attitudes and declared priorities in teaching as well as implementation of the new ideas. The interviews have provided a basis for qualitative analysis of the data. Lesson observations have enabled the researcher to validate the opinions presented in the interviews. The data obtained has been analyzed in the following areas: · teachers' views on European educational policy; · teachers' language learning experience; · teachers' language teaching experience; · teachers' attitude to educational changes. The principal concern behind organizing the project is with an understanding what conditions have to be satisfied in order to encourage teachers to implement changes in their practice.

E 20
29 August 2007 14:30 - 16:30
Room: 7.59
Symposium

Institutional and compositional school effects on students' academic achievement

Chair: **Michael Becker,** Max Planck Institute for Human Development, *Germany*
Organiser: **Jürgen Baumert,** Max Planck Institute for Human Development, Berlin, *Germany*
Organiser: **Ulrich Trautwein,** Max Planck Institute for Human Development, *Germany*
Organiser: **Michael Becker,** Max Planck Institute for Human Development, *Germany*
Discussant: **Hans Luyten,** University of Twente, Enschede, *Netherlands*

The symposium examines institutional and compositional school effects on school achievement and basic cognitive abilities. In recent years, school effectiveness research has corrected the pessimistic picture painted by the classic Coleman Report (Coleman, 1966), which concluded that school quality has barely any impact on students' development. This symposium will further consolidate this positive position by examining the importance of school for development in childhood and adolescence. The following three aspects will be addressed in detail: - School effects on cognitive functioning are substantial. Effects are shown on several measures, especially academic achievement measures such as reading, writing, and mathematics skills, and measures of cognitive abilities such as fluid intelligence. - School effects can have multiple sources. The symposium highlights the importance of both compositional features (e.g., class-average achievement and motivation of classmates) and institutional factors (e.g., course choice options and curricular differentiation). - School effects may work in both directions. It is possible to identify factors with a negative influence on student performance, as well as factors that have a positive influence on schools, such that students' performance exceeds expectations.

Differential achievement trajectories in the Swiss secondary school system: The influence of institutional and compositional effects on achievement gains in French as a Foreign Language
Marko Neumann, Max Planck Institute for Human Development, *Germany*
Inge Schnyder, University Fribourg, Switzerland, *Switzerland*
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Alois Niggli, Pedagogical Universitiy, Fribourg, Switzerland, *Switzerland*
Oliver Lüdtke, Max Planck Institute for Human Development, *Germany*

Based on a representative sample of N = 1704 eighth grade students from two Swiss cantons, the present study examines achievement gains in French as a foreign language in the different tracks (higher, middle, lower) of the Swiss secondary school system. The main focus lies on effects resulting from differences in the educational environments of the tracks. Due to selective admission, there are considerable differences in the intellectual and social student composition of schools/classes in the different tracks. In addition to these compositional differences, differences in institutionalized learning opportunities need to be considered. Such institutional factors can be attributed to differential traditions of teacher education, didactics, and curricula, and corresponding differences in the quality of instruction (institutional effects). Results of multilevel analyses showed that students' learning progress differed between the tracks, even when controlling for various intake characteristics (including prior knowledge) at the student level. This finding points to differences in the educational learning environment of the tracks. Further analyses revealed that these track differences in student gains persisted, even when controlling for the intellectual and social composition of the student body at the class level. Taken together, the results indicate that differences in the learning environment are not only a result of the tracking process itself (compositional effect), but also seem to be institutionally created (institutional effect).

Choosing in schools: Locating the benefits of specialization
Peter Davies, Staffordshire University, UK, *United Kingdom*
Neil Davies, University of Bristol, UK, *United Kingdom*
Nick Adnett, Staffordshire University, UK, *United Kingdom*
David Hutton, Durham University, UK, *United Kingdom*
Robert Coe, Durham University, UK, *United Kingdom*

Recent policy in England has suggested that educational outcomes will be raised if schools specialise in particular subjects. In contrast, calls for the reform of 16-19 education have suggested that these outcomes will be improved if students become less specialised in their studies. Currently 16-19 year-old students in England choose from a wide range of vocational and academic subjects to study. The majority choose a combination of four subjects to study for one year (AS levels), narrowing to a combination of three subjects (A levels) in the second year of their advanced study. Many students are also able to choose whether to study in a school or in a sixth form college. At present, there is a limited evidence base from which to judge the merits of varying the degree of choice and specialisation in students' advanced study. In particular, we do not know the extent to which students' achievements in 16-19 education are higher when they choose subjects which play to their perceived strengths. We also do not know whether students are more likely to choose to study subjects taught by more effective departments. That is, outcomes may be affected by the relative strengths of students or departments in circumstances where there is freedom to choose. In this paper we provide evidence of the existence and strength of the relationships using a database of the achievements of 177344 students in 568 institutions. We examine the probability of a student choosing each of thirteen possible subjects. This evidence suggests that reducing the scope within schools for specialisation or competition will reduce average student attainment and these

effects ought to be taken into account when evaluating alternative curriculum policies. The relative effectiveness of departments appeared to have very little effect on students' choices.

Impact of students' and their schoolmates' achievement motivation on the status and growth in math and language achievement of boys and girls across grades seven through eight
Eva Van de gaer, Catholic University, Leuven, *Belgium*
Jan Van Damme, Catholic University, Leuven, *Belgium*
Georges Van Landeghem, Catholic University, Leuven, *Belgium*

The present study focuses not only on the impact of students' achievement motivation, but also on the influence of achievement motivation of fellow students on status and growth in language and math achievement across Grades seven and eight. The achievement motivation of schoolmates may create a learning environment that facilitates or impedes learning above and beyond what would be expected on the basis of the individual student's achievement motivation, intelligence and background characteristics. Data from the LOSO-project, a longitudinal study in secondary education, have been analyzed using multilevel linear growth curve modeling. It turns out that the effect of achievement motivation, both of individuals and in groups, should not be neglected in explanations of individual progress in achievement, even when ability and background characteristics such as the socio-economic status, age, sex and home language have been controlled for. In addition, the data suggest that especially boys with poor achievement motivation at the start of secondary education are at risk of falling behind with regard to language achievement in the subsequent years.

Cognitive development in Dutch primary education: The impact of individual background and classroom composition
Hans Luyten, University of Twente, Enschede, *Netherlands*
Kim Schildkamp, University of Twente, Enschede, *Netherlands*

A sample of 815 Dutch pupils from 49 classes were followed from grade 3 (age 6) through grade 7 (age 11) of primary education. Every six months test scores were obtained for spelling and mathematics. This resulted in 9 test scores per subject for each pupil. Different growth trajectories were estimated for three categories of pupils, namely socio-economically disadvantaged immigrant pupils, Dutch socio-economically disadvantaged pupils and others. Socio-economic disadvantage was measured by means of the educational level of the pupils' parents. The relationship between classroom composition and cognitive development was analysed as well. The results of the multilevel analyses with repeated measures indicate similar patterns for spelling and mathematics with regard to the impact of individual background. For both subjects a substantial disadvantage is observed already in grade 3 (age 6) for both the immigrant and Dutch disadvantaged pupils. The size of this difference changes only to a limited extent from grade 3 to 7, but the Dutch disadvantaged pupils appear to lag a little further behind than their immigrant counterparts. Classroom composition shows no significant effect for spelling, but classes with a high proportion of disadvantaged pupils show a modest disadvantage for mathematics early in grade 3, which is quickly reduced, however. Still, in grade 7 the differences between classes with high and low proportions of disadvantaged pupils appear to widen again. The findings show that educational disadvantages related to low socio-economic status are already apparent at the early stages of primary education and reducing these advantages calls for strategies that focus on very young children. Additional disadvantages related to aggregate student backgrounds appear to occur especially at the final stages of Dutch primary education.

Value added in first grade of primary school: Does it differ between schools with high concentrations of socially disadvantaged children?
Jan Van Damme, Catholic University Leuven, *Belgium*
Jean Pierre Verhaeghe, Catholic University Leuven, *Belgium*

This study investigates to which degree group composition with regard to social and ethnic-cultural background affects first grade pupils' learning in mathematics, reading fluency and spelling. Using data from an ongoing large longitudinal study, we focus on the diversity in value added scores among schools with similarly high proportions of socially disadvantaged or ethnic minority children, comparing with the diversity among 'white middle-class' schools. Results of multilevel analyses reveal significant but only small group composition effects related to school average SES and proportions of non-Dutch speaking pupils in first grade. No interaction effects with individual pupil characteristics were found. Having schools clustered in four types according to the proportions of pupils in first grade from different SES-levels and home language, it was found that the within-type-of-school diversity in value added is much larger than differences between "types" of schools. Many low SES schools even generate value added scores that equal or outperform many white middle-class schools. That is observed in all three learning domains, but appeared to be particularly the case in the domain of mathematics. These findings have to be related to the findings with respect to the impact of social background at the individual student level, which – over and above prior achievement and other influential factors – is not very large either. The results of our analyses questions the widely spread belief – also prominent within the ethnic minority communities – that schools with high concentrations of socially deprived and/or ethnic minority children by definition yield less quality.

E 21
29 August 2007 14:30 - 16:30
Room: 0.65
Symposium

International perspectives on mathematics teaching and lesson structure

Chair: **Yoshinori Shimizu,** University of Tsukuba, *Japan*
Organiser: **David Clarke,** University of Melbourne, *Australia*
Discussant: **Yoshinori Shimizu,** University of Tsukuba, *Japan*

Among the many virtues of international comparative research is the capacity to provide insight through extreme contrast. Each of the four papers that comprise this symposium adopts a distinct analytical approach to the analysis of teaching and lesson structure in mathematics classrooms. Each paper's analysis offers a distinctive view of the collaborative construction of classroom practice by the participants. Each analysis illuminates the process by which instructional norms of practice were established in each setting. Among the issues discussed is the question of whether the teacher and students' goals can be thought of as at all in harmony or are more likely to be in conflict. In the second study, having distinguished Swedish classrooms from US and Australian classrooms with respect to student-initiated repair activities, an analysis of historical video footage is undertaken to investigate the evolution of this distinctive practice. The third study addresses the challenge of finding a legitimate unit for international comparisons of lesson structure and the

fourth paper revisits the notion of instructional units from the combined perspectives of teacher and students. All four studies make use of data from the Learner's Perspective Study (LPS) and all four studies accept an obligation to situate teacher and student activity as mutually facilitating and mutually constraining. The need to consider both perspectives – analytically and in the process of data generation – is fundamental to the LPS research design. The resultant analyses take the investigation of the norms of classroom practice from goal alignment, through collaborative repair, to the question of possible units of instruction and the ways in which these units are perceived by classroom participants.

Teacher and student perspectives on mathematics lessons: A Shanghai case study
Ida Ah Chee Mok, University of Hong Kong, *Hong Kong*

Classrooms in Asian regions were sometimes described as teacher-dominating with passive learners. This was an essentially negative image because many pedagogical theories advocate opportunities for students' participation and free expression of ideas and denounce the idea that the teacher should take too much control in a lesson. Many studies seeking for a better understanding for the nature of the teaching in Asian regions have been carried out and they suggest very clearly that the simple phrase "teacher-dominating" tells too little to inform how the nature of the teacher's intervention may contribute to learning. The Learner Perspective Study (LPS) collects a rich data set of the lessons, the teachers' and the students' interviews. The "insiders" in this paper refer to the teacher and the students who are the key people in lessons. The findings discussed represent a case of a Shanghai teacher moving away from a traditional model of knowledge transmission towards a synthesis based on his own pedagogical philosophies. There is a match between what the teacher wants to give and what the students want to get and this is likely to be a key to a better learning.

Proof, authority, and agency: intimations from an 8th grade mathematics classroom in Israel
Michael Fried, University of the Negev, *Israel*
Miriam Amit, University of the Negev, *Israel*

Much research in mathematics education has looked at students' conceptions and misconceptions of proof. The attempt to characterize these conceptions sometimes clouds the fact that they are fluid and unsettled. By assuming from the start that students' views on proof are not fixed, one can alternatively try and identify the forces at work forming them. The present paper adopts this second approach. Relying on qualitative data from an 8th grade classroom, evidence is adduced suggesting that students' emerging views of proof may coincide with emerging relations of authority.

Historical and international comparisons of students' and teacher's participation in repair sequences in whole-class teaching
Fritjof Sahlström, Uppsala University, *Sweden*
Cathrin Martin, Uppsala University, *Sweden*

The aim of the reported research is to investigate historical changes and international contemporary differences in students' and teachers' participation in repair sequences in whole-class teaching. In a growing number of conversation analysis studies, research on learning has been successfully pursued through analysis of longitudinal changes in participation in repair and correction. Prior historical and international comparisons of classroom interaction have overwhelmingly been based on aggregates of coded classes or categories of action. This study

investigates classroom video materials from two primary sources: the Learner's Perspective Study (LPS) database and a Swedish historic classroom materials database. In this study, ten consecutive Mathematics lessons in Sweden, the US and Australia have been used. In addition, Swedish classrooms, recorded with audio and/or video, in 1968, 1972, and 1993-1995 have been used. The results show that in all materials, the vast majority of repair initiations are done by the teacher, most commonly correcting student errors in answers to teacher questions. However, when comparing student repair, the materials are different. In the Swedish materials, students quite frequently initiate repair and suggest corrections to teacher turns, which is not the case in the US and Australian materials. The results also show that historical changes in the way repair is carried out in Swedish classrooms have taken place, with students actively taking part in all aspects of the repair sequence, including initiation, in the later materials. For the teachers, the changed student participation in repair sequences has weakened the teacher control over classroom repair. The study contributes to accumulating knowledge of how classroom repair is carried out, addresses learning consequences of different ways of organizing student participation in repair sequences.

Addressing the challenge of legitimate international comparisons of classroom practice
David Clarke, University of Melbourne, *Australia*
Carmel Mesiti, University of Melbourne, *Australia*
Catherine O'Keefe, University of Melbourne, *Australia*
Li Hua Xu, University of Melbourne, *Australia*

In this paper, we address the choice of suitable instructional units that might serve as the basis for cross-cultural analyses of classroom practice. Our argument draws on analyses undertaken as part of the Learner's Perspective Study (LPS). The database comprised a three-camera video record of sequences of ten consecutive lessons in each classroom, supplemented by post-lesson video-stimulated interviews with teachers and students: a total of over 180 videotaped lessons, over 50 teacher interviews and almost 400 student interviews. The results of these analyses challenge the suitability of the lesson as the unit of comparative analysis. In particular, the location of the lesson in the topic sequence is seen to be a key influence on the lesson's structure, critically affecting the teacher's deployment of the constituent activities that we have called 'lesson events.' The lesson event is proposed as an alternative unit of international comparative analysis of classroom practice.

E 22
29 August 2007 14:30 - 16:30
Room: 0.100C
Symposium

Learning through storification: Enhancing narrative learning environments with technology

Chair: **Giuliana Dettori,** CNR, Institute for Eductional Technology in Italy, *Italy*
Organiser: **Sanne Akkerman,** Utrecht University, *Netherlands*
Organiser: **Bregje de Vries,** Teacher College, Radboud University Nijmegen, *Netherlands*
Discussant: **Jerry Andriessen,** Utrecht University, *Netherlands*

This symposium addresses the question how technology can be used to support learning through storification. Storification is defined as 'the process of constructing stories by structuring and

organizing new experiences in a plot, according to personal insights and appreciations, in order to develop and articulate personal understanding'. It is argued that through storification we can integrate old and new experiences in coherent chains of events, relate the ordinary and exceptional, and give reason-driven accounts expressing personal appreciations (Bruner, 1990; Hermans & Hermans-Jansen, 1995). As such, storification contributes to the intertwined development of (meta-) cognitive and affective competences and fits a constructivist view on learning as situated and self-regulated (Kelchtermans, 1997). Researchers from the fields of instructional design amd computational science have started to explore technological tools with which multifaceted and engaging narrative learning environments can be created (Dettori, Gianetti, Paiva & Vaz, 2006). The role of technology seems twofold: (1) to support and augment authoring of stories, and (2) to support and augment participation in stories. In this symposium, four papers are presented on technology enhanced narrative learning environments. The symposium seeks to combine insights from different fields (psychology, instructional design, computational science), different tools (from mobiles to database software) and different educational settings (from special needs to teacher training). The purpose of the symposium is to contribute to scientific insight in the psychology of storification as a learning process, and the potential of technology in supporting storification. References Bruner, J. (1990). Acts of meaning. Cambridge, Massachusetts: Harvard University Press. Dettori, G., Giannetti, T., Paiva, A., & Vaz, A. (Eds.) (2006). Technology-mediated narrative environments for learning. Rotterdam: Sense Publishers. Hermans, & Hermans-Jansen (1995). Self-narratives: The construction of meaning in psychotherapy. Kelchtermans, G. (1997). A sample card of narratives in education. Teaching and Teacher Education, 13(1), 125-130.

Developing a design for narrative learning in an interactive learning environment
Lisa Gjedde, The Danish University of Education, *Denmark*

Story is fundamental to the process of meaning making and learning. A new learning design for narrative learning was developed, which was based on the use of a narrative framework as a guiding agency in the introduction to the learning materials, as well as providing resources for the learners exploration and research of the topic and integrated production tools, to support the learner's own productions of stories within the framework of the main story. The learning environment provided an alternative learning arena, enhancing motivation in the classroom by allowing for learners at different levels to engage in the learning process.

Learning history by storification: a mobile game in and about medieval Amsterdam
Sanne Akkerman, Utrecht University, *Netherlands*
Wilfried Admiraal, University of Amsterdam, *Netherlands*

The aim of this study is to analyze the effect of a mobile and multimedia game designed for history education in terms of a narrative learning environment. Especially in history education, narrative can be argued very useful to overcome fragmentation of knowing historical characters and events, by relating these with meaningful connections of temporality and sequence. In the game studied, pupils explore the history of Amsterdam by walking in the city, experiencing characters, buildings, and events, while using UMTS/GPS phones for communication and exchange of information. The central question of the study is how and to what extent the mobile learning and gaming character supports the construction of historically relevant stories. The history game was played by 10 secondary school classes of 25 pupils on average. The game lasts two days and is played in groups of four pupils. All information and communication during the games is collected, as are the final essays written by the groups. In addition, a selection of the

teachers and pupils are interviewed. The design of the game as well the actual gaming process is analyzed with respect to story construction and historical knowledge. First results indicate that the game as narrative learning environment succesfully supports a process of storification. However, it seems that gaming elements partly dominate the construction of knowledge that is historically relevant. On the basis of this, mobile games can be argued valuable in stimulating storification. However, care is needed in designing educational games in terms of mixing fictional with the subject related learning effects.

Using blogs for storification and professional reflection: the case of mathematics teachers
Katerina Makri, University of Athens, *Greece*

This paper focuses on the use of narrative in the area of higher education, in a context of post graduate courses in Mathematics education, addressed to Mathematics teachers. On the basis of previous research in the fields of Technology enhanced learning environments, Mathematics education and narrative theory, it provides a broad, process-oriented definition of narrative, as a framework for the design and implementation of a technology enhanced learning environment: a class blog for online, asynchronous communication in two six-month courses. The tool was used as a mediator of specific CSCL activities for the participants, such as co-construction of pedagogical materials, inquiry and reflection. Narrative was a major element in its design, which aimed at triggering specific acts of narrating, consequently producing different kinds of narratives and finally, at providing learning outcomes related to narrative expression. The discussion comprises parts of the data analysis related to these design aspects, to form an evaluation based on narrative principles.

Developing a narrative knowledge base: Storification by teachers on their role as designers
Bregje de Vries, Teacher College, Radboud University Nijmegen, *Netherlands*

This study seeks to investigate what, according to teachers, the skills are that teachers need to become designers of innovative learning arrangements. Under headings such as ‘new learning’, a view on learning as situated and collaborative has been implemented in schools (Simons, Van der Linden & Duffy, 2000). As a result, the role of teachers is changing. Besides instructors, they become designers of innovative learning arrangements in which multiple work formats and trajectories are arranged, and (groups of) learners can choose which way to go. Designing the arrangements is new to most teachers. Although they have implicit knowledge about how to organize learning situations, teachers have only little experience with designing complex ones. To become reflective designers, teachers therefore need to articulate and share their experiential stories about organizing education with colleagues. In this study, teachers of primary and secondary schools in the Netherlands were invited to share stories about designing innovative learning arrangements to build a database for anecdotal evidence and develop practice-based theory on the teacher as designer. The findings suggest that teachers’ stories talk much about ‘awareness of students’ needs’, but express less extended ideas about how to design a range of didactical approaches. The stories only cover existing models on instructional design partly as higher levels of designing instruction are hardly present in teachers’ stories, and teachers view designing as an individual trial rather than a cyclical collaborative process. The teachers’ stories show which skills can be taken as a starting point to make teachers aware of their future role as designers, and at the same time point out which skills need to be added in teacher training to prepare them well for this job.

E 23
29 August 2007 14:30 - 16:30
Room: 1.58
Symposium

Studying teacher education

Chair: **Christopher Clark,** University of Delaware, *USA*
Organiser: **Christopher Clark,** University of Delaware, *USA*
Discussant: **Michal Zellermayer,** Levinsky College of Education, *Israel*

Symposium Abstract The scientific yield of nearly sixty years of studying teacher education is profoundly disappointing. Two of the foremost American authorities on teacher education research, Marilyn Cochran-Smith and Kenneth Zeichner, conclude in their 800-page edited volume entitled "Studying Teacher Education" (2005) that there is no scientific basis for confidence in the effectiveness of, necessity for, or superiority of any of the many practices and design variations of teacher education programs studied in the USA. This symposium challenges the dark claim by Cochran-Smith and Zeichner and advocates a radical shift in focus of research on teacher education, turning away from conceptualizing teacher education research as a scientific quest for "one best method" or for the "laws of learning to teach" and toward re-conceptualizing teacher education research as local, formative evaluation aimed at contextualized improvement of particular teacher education programs. Symposium papers will argue the case for a paradigm shift in research on teacher education and provide examples of studies of teacher education in the USA, Canada, and The Netherlands that illustrate what this paradigm shift will look like.

Studying teacher education
Christopher Clark, University of Delaware, *USA*
Frances O'C. Rust, New York University, *USA*

Christopher M. Clark of the University of Delaware and Frances O'Connell Rust of New York University will open the symposium by offering their assessment, drawn in part from the Clark, et al. (in press) critical review of the book Studying Teacher Education (2005), of the state of research on teacher education in the USA and internationally. Clark and Rust advocate a change in direction of the field, away from the quest to define one best model of teacher education and toward local formative evaluation and gradual improvement of particular teacher education programs. The paper will describe ways in which teacher education program designs in the USA do and do not reflect established scientific and craft knowledge about effective teacher education and describe the apparent consequences for teacher education program reputation, success of teacher graduates, and demands on teacher education faculty.

Partnerships as amplifiers of teacher education
Buitink Jaap, University of Groningen, *Netherlands*

Jaap Buitink of the Academic Centre for Teaching and Learning of the University of Groningen, The Netherlands reports on an international comparison of partnerships in teacher education with emphasis on the limitations of current thinking on partnerships. Stressing the perspective of the learning process of student teachers, Buitink's research leads to his proposing a new approach to structuring teacher education and collaboration between schools and institutes for teacher education. The paper describes how partnerships between teacher education programs and local

education agencies can amplify and align the connections between effective teacher education, supervised field experiences, and post-graduate classroom teaching. The paper describes challenges and successes in the development of partnerships between schools and the teacher education program at the University of Groningen.

Teaching competencies during pre-service training: What we know about their construction
Colette Gervais , University of Montreal, *Canada*
Enrique Correa Molina , University of Sherbrooke, *Canada*
Michel Lepage , University of Montreal, *Canada*

A better understanding of the construction of teaching competencies during the training of future teachers would help to promote their learning potential. We identify progressive demonstration of competencies and resources mobilized in action and describe the process at work in their construction. A better understanding of this process will allow educators to intervene in a more effective way to help the trainees in their apprenticeship. Data was collected from: 22 student teachers during secondary school internships (2nd, 3rd and 4th years of training) via video recordings of class situations and explicitation sessions of their practice, 15 cooperating teachers and 6 university supervisors. The approach used is based on the practical argument (Fenstermacher, 1994) that is aimed at encouraging teachers to verbalize their practice. We analyzed the transcripts of all sessions and validated the interpretations between co-researchers. Persisting changes appeared in the manifestation of competencies. The organizing principle of this construction is confrontation of the reality of teaching practice, which suggests a reflexive process that regulates experience and performance.

The teacher quality partnership research enterprise: Enabling systemic understanding and improvement
Robert J. Yinger, University of Cincinnati, *USA*
Daniel Kelly, University of Cincinnati, *USA*

Over the past decade, research has documented the importance of teacher quality for school effectiveness and student achievement. The Teacher Quality Partnership was created to address the critical need for large-scale and longitudinal research that examines the characteristics and practices of effective teachers and to identify the patterns and empirical linkages of teacher preparation and professional learning that promote student achievement as measured by academic growth. This presentation will describe the research enterprise designed by the Teacher Quality Partnership, a research and policy consortium involving all 50 teacher preparation institutions and key education agencies in the State of Ohio, USA.

E 24
29 August 2007 14:30 - 16:30
Room: 0.83 Eötvös
Symposium

Technology-based assessments of learning strategies and self-regulation of learning

Chair: **Joachim Wirth,** Duisburg-Essen University, *Germany*
Organiser: **Joachim Wirth,** Duisburg-Essen University, *Germany*
Discussant: **Sarah Manlove,** Universiteit Twente, *Netherlands*

Many aspects of the use of learning strategies as well as of the self-regulation of learning are not readily observable. Therefore, one challenge in studying self-regulated learning is to find ways to document these aspects. Questionnaires and other widely used self-report measures regard self-regulated and strategic learning as a trait that can be assessed independently from a specific learning situation. But inconsistent and low correlations with learning outcome indicate a low validity of these measures. Technology-based assessments regard self-regulated and strategic learning as an event and therefore record behavioral data online while a specific learning process. Several studies using these kinds of technology-based online measures demonstrate their moderate to high validity. Thus, it seems that technology-based measures are promising new approaches on the assessment of learning strategies and the self-regulation of learning. The symposium presents new developments in the field of technology-based online measures including computer-based as well as video-based methods. Chances and challenges will be discussed concerning their implications on models and theory of self-regulated learning and concerning practical issues of the assessment and the support of self-regulated and strategic learning.

What happens during the learning process? A study with 11th graders in self-regulated learning, their motivation and their learning strategies
Anita Püttmann, University of Frankfurt, *Germany*
Regina Vollmeyer, University of Frankfurt, *Germany*

The cognitive-motivational process model (Vollmeyer & Rheinberg, 1998) assumes that initial motivation affects performance via the mediator strategies - besides the mediators motivational state and functional state during the learning. However, there is a discussion as how to measure strategy. Self-reported measures and objective measures do not predict performance in the same way. Therefore in this study we tried to find several objective indicators for strategy. While students were learning using a pc-based physic program initial motivation, motivation and flow while learning, and learning strategies were measured. Participants were 32 high-school students (15 female, 17 male), average age 16.25. As the first aim of the study was to test several strategy indicators we ran a factor analysis which revealed two factors that could be interpreted as qualitative and quantitative clusters. However, only the qualitative cluster, and especially "time spent on animations" influenced performance. A second aim was to test the cognitive-motivational model. As the correlation between the applied strategies, motivational variables and performance, demonstrated gender differences we ran a path analysis. This path analysis ends up the attempt to understand what happens during the learning process.

Assessment of self-regulated learning in a computer-simulated science lab
Joachim Wirth, Duisburg-Essen University, *Germany*
Josef Künsting, Duisburg-Essen University, *Germany*
Hubertina Thillmann, Duisburg-Essen University, *Germany*

Previous studies have shown that students who learn in a complex and dynamic learning environment have to pursue two goals simultaneously. They have to generate new information and they have to integrate new information into their own knowledge structure. Studies investigating this aspect of self-regulation showed that successful learners start with identifying new information but change very soon and very strongly to integrating information. These studies used a computer-based learning environment that records behavioral data automatically, and these data were used to construct a behavior-based measurement of self-regulation. But the environment is embedded in artificial contexts. Thus, it doesn't allow for generalizing the results to authentic learning situations. Therefore, we developed an authentic computer-simulated science lab where students could conduct experiments. We adapted the computer-based measurement of self-regulation to this environment. Results show that also in this authentic learning environment successful learners start with identifying and change very soon and very strongly to integrating information. Additionally, prior knowledge turned out to be a pre-requisite for a successful self-regulation of learning. Results also show that learners have difficulties with self-regulating their learning. The computer-based learning environment and its behavior-based measurement of self-regulation seem to be promising tools for individually adapting online-support.

Promoting and researching writing strategies: A self-regulated learning perspective
Kiku Tupper, University of Victoria, *Canada*
Mariel Miller, University of Victoria, *Canada*
Allyson Hadwin, University of Victoria, *Canada*

Academic writing is a highly demanding and intricate task holding important implications for both academic and professional success. In light of the need for effective strategy instruction in writing and limitations of instructional writing texts and programs, theories of self-regulated learning (SRL) have shown great promise in directing strategy use and increasing writing abilities. Future research is needed to validate a greater range of strategies, apply SRL strategy instruction to a more mainstream educational population, and examine the specific processes underlying success in SRL strategy use. This paper: (a) describes a writing kit that uses an SRL framework to embed empirically validated strategies in an eLearning environment, gStudy (Winne, et al., 2006), and (b) illustrates how self-report and trace data can be combined to research five important questions about self-regulated writing strategy development across complex writing tasks.

Advancing log analysis of student interactions with cognitive tools
John C. Nesbit, Simon Fraser University, *Canada*
Philip H. Winne, Simon Fraser University, *Canada*
Mingming Zhou, Simon Fraser University, *Canada*
Yabo Xu, Simon Fraser University, *Canada*
Jillianne Code, Simon Fraser University, *Canada*
Maria Weatherby, Simon Fraser University, *Canada*

We have developed a software application (gStudy) that supports learning with multimedia documents. Students use gStudy to create and link notes, highlight and label text and images, construct glossaries and concept maps, archive web content, exchange information objects through

a chat interface, and perform other operations on multimedia content. The detailed log files recorded by gStudy constitute a wealth of data about how students process information as they learn. Through two research cases, university undergraduates studying educational psychology (N = 90) and secondary students learning argumentation (N = 73), we describe log parsing and data mining methods we borrowed from computer science and developed to operationalize psychological constructs. The log analysis tools were used to show that the way learners studied an educational psychology text, as measured by log analysis, covaried with their self reports of achievement goal orientation. We found relationships between goal orientations and activity traces indicating various forms of cognitive engagement. For example, self reports of mastery approach goal orientation were negatively related to amount of highlighting, a study tactic that may be used by students as a low-engagement, surface approach to learning. Recently, we developed data mining software that returns the longest common subsequences of gStudy actions, and are currently using these subsequences to analyze how secondary students interact with online texts in preparing arguments.

F 1
29 August 2007 17:00 - 18:20
Room: -1.62
Paper Session

Assessment of competence

Chair: **Patrik Scheinin,** University of Helsinki, *Finland*

From theoretical notions of competence to adequate psychometric models
Johannes Hartig, DIPF, *Germany*
Eckhard Klieme, DIPF, *Germany*

In educational assessment, the term competence is associated with the idea of assessing complex combinations of abilities and skills that are needed in specific real life situations. This complex, context specific definition of competencies differs from most traditional constructs in cognitive ability testing, which are often conceptualized to consistently affect performance behavior across a large range of different situations. Nevertheless, in empirical studies often the same traditional psychometric models that are usually used in ability testing are applied in the measurement of competencies. The aim of this paper is to analyze and illustrate the different demands on psychometric models that arise from the conceptualization of competencies as complex, context specific constructs compared to traditional ability testing. Adequate measurement models for competencies can do more than summarize to what extent an individual will master certain situations. If interactions between different abilities of persons and different situational demands are represented adequately, psychometric models for the measurement of competencies can support the understanding of why persons are successful in coping with certain situations. A brief overview of existing psychometric models that may meet these demands is given, and one possible model meeting the demands outlined in the paper is illustrated using data from a large scale assessment of foreign language competencies. Implications of the use of adequate psychometric models for the development of empirical methods to assess competencies are discussed.

Conditions of immigrant students' competency status and development in mathematics and science: Results from a German supplement study to PISA 2003
Oliver Walter, Leibniz-Institute for Science Education, *Germany*

The results of both of the OECD-Programme for International Student Assessment (PISA) studies have called educational researchers´ attention to the educational success of immigrant students in the participating countries. Especially in Germany, students who immigrate together with their parents (first-generation immigrant students) perform much worse than native students and children of immigrants born in Germany (second-generation students) perform even worse than first-generation students. Research indicates that the differences in mean competencies in reading, mathematics and science between the aforementioned student groups correlate with the students´ social, cultural and economic background and their language abilities. But since PISA is designed as a sequence of cross-sectional studies it is very difficult to make causal inferences. Because of this the German PISA research consortium has conducted a supplement study to PISA 2003. This supplement study has been called PISA-I-Plus and has assessed the performances of the same 6,020 students in mathematics and in science in their ninth and tenth grade. Therefore, it was possible to analyze the immigrant students´ performance gains and to relate their competencies at ninth and tenth grade to social, cultural and economic factors and language usage. The results for

science show that first-generation students learn the most, whereas second-generation students lag behind native students. In contrast, there were no significant differences between the groups' mean gain scores in mathematics. Multi-level-analyses show that social, cultural and economic factors have a significant influence on performances until the end of ninth grade, but lost much of their predictive power at the end of tenth grade. They also show that negative effects of a high percentage of immigrant students in school seems to be mediated by a low level of general cognitive abilities at the school level.

The free fall of Dutch written arithmetic: what can solution strategies tell us?
Marian Hickendorff, Leiden University, *Netherlands*
Cornelis M. van Putten, Leiden University, *Netherlands*
Willem J. Heiser, Leiden University, *Netherlands*
Norman D. Verhelst , CITO, Arnhem, *Netherlands*

In the Netherlands, achievement on problems of written arithmetic shows a steady decline over the last two decades. This is reported in the fourth consecutive large-scale national assessment of the level of mathematical competence at the end of primary school. By investigating the strategies pupils used in solving problems of written division, this study aims at contributing to the explanation of this decline. For the assessments of 1997 and 2004, strategies for solving written division problems were studied and classified as being either traditional long division, or some form of a so-called realistic strategy. Furthermore, it occurred quite often that pupils stated an answer, without writing down any calculations. Results show that two important changes took place from 1997 to 2004. Firstly, fewer pupils solved the problems by the traditional algorithm in 2004 than in 1997. That could be expected because of the Dutch reform in mathematics education, the Realistic Mathematics Education (RME). However, the amount of pupils using realistic strategies did not increase accordingly, but was quite stable. Instead, more and more pupils stated an answer without working, which turned out to be a quite unsuccessful approach. Secondly, traditional and realistic strategies and stating an answer without working were all significantly less successful in 2004 than in 1997. So, pupils not only shifted to a less successful strategy, they also were less successful in using all strategies.

Is the objective structured clinical examination (OSCE) the best method to assess graduating junior medical doctor's skills competences?
Griet Peeraer, University of Antwerp, *Belgium*
Arno Muijtjens, Maastricht University, *Netherlands*
Roy Remmen, University of Antwerp, *Belgium*
Benedicte De Winter, University of Antwerp, *Belgium*
Kristin Hendrickx, University of Antwerp, *Belgium*
Leo Bossaert, University of Antwerp, *Belgium*
Albert Scherpbier, Maastricht University, *Netherlands*

aims One goal of undergraduate assessment in medical education is to predict medical students' (future) performance. In the area of skills testing, the objective structured clinical examination (OSCE) has been of great value as a tool to test a number of skills in a limited time, with bias reduction and improved reliability. It is therefore used in several final and licensing examinations to test junior doctor's skills competences. But can OSCE's measure competences acquired through medical clerkships in the field of basic clinical skills? method Undergraduate students (N=32) were given a questionnaire with 184 basic clinical skills. We asked them to score the number of times they performed each skill during their clerkships (12 month period in year 6). We assessed

the students before starting their clerkships in year 6 and again at the start of year 7 (undergraduate training takes 7 years in Belgium) using a 14 station OSCE assessing basic clinical skills. Both a checklist and global ratings were used to score performance. Clerkship experience and both OSCE scores (checklist and global rating) were used in a linear regression, with OSCE-scores from year 6 as a moderator. findings No significant relations were found between frequency of performing skills during clerkships and OSCE scores. Students scored significantly higher OSCE scores in year 5 then in year 7; this means that after having practiced the skills during clerkships, they score lower on the same test. Take-home messages OSCE's seem not to reflect clinical experience. Other more integrated assessment methods may prove to be more valid to test final undergraduate skills levels.

F 2
29 August 2007 17:00 - 18:20
Room: -1.64
Paper Session

Educational attainment

Chair: **Alexander Renkl,** University of Freiburg, *Germany*

Effective screening tools for children with working memory impairments
Tracy Alloway, University of Durham, *United Kingdom*
Sue Gathercole, University of York, *United Kingdom*
Joe Elliott, University of Durham, *United Kingdom*
Hannah Kirkwood, University of Durham, *United Kingdom*

The term 'working memory' refers to the capacity to store and manipulate information in mind for brief periods of time. Working memory capacities are strongly related to learning abilities and academic progress, predicting current and subsequent scholastic attainments of children across the school years in both literacy and numeracy. Moreover, children with pervasive learning difficulties are characterised by marked impairments of working memory function that are rare in unselected samples of children. One suggestion for why working memory constrains learning is that this system acts as a bottleneck for learning in many of the individual learning episodes required to increment the acquisition of knowledge. Because low working memory children often fail to meet working memory demands of individual learning episodes, the incremental process of acquiring skill and knowledge over the school years is disrupted. Early identification of poor working memory skills in individual children is clearly desirable given the links between memory abilities and learning in the classroom. This paper discusses two different tools for effectively identifying children with poor working memory skills. The first is a computerized test battery consisting of multiple tasks measuring different memory components. This tool is based on theoretical models of working memory. A second tool is a checklist for teachers based specifically on key behavioral characteristics in the classroom that children with working memory impairments exhibit. Data from children with low and average working memory skills on both these screening tools and comparisons with other standardized memory assessments (such as the Wechsler Intelligence Scale for Children—IV memory scale) will be presented. Benefits of screening tools for teachers include minimal training required, high face validity, and a quick and cost effective means of

alerting teachers to the warning signs of memory deficits that will impair learning will also be discussed.

Subversive school leadership in highly disadvantaged communities
Stephen Jones, Sheffield Hallam University, UK, *United Kingdom*

This paper outlines issues and theoretical outcomes from two recent case studies conducted in similar yet contrasting highly disadvantaged communities in England. The paper outlines dilemmas and problematic issues concerning leadership and practice in these schools/communities: -The nature of leadership required -The fragility of leadership -The need for idealism and pragmatism -The difficulties yet leadership necessity of working with parents and the surrounding community -Raising horizons and expectations -The political leadership task involved in work with other agencies locally -Raising and maintaining a school's reputation. Aspects of a "Subversive Leadership" approach are explored. This way of working involves boundary crossing, building networks and operating in a complex micro-political environment. These networks need to operate for the benefit of local people, especially children attending school, with child-centred values being essential to providing a positive response to their needs. School leaders are viewed as most effective where they feel able to subvert external policy imperatives to meet the needs of local children in a whilst addressing colleagues' collective values.

The content of the work of classroom assistants in Finland
Marjatta Takala, University of Helsinki, *Finland*

In this presentation the role of classroom assistants will be defined, both in mainstream and in special education. The assistant is a support for students in mainstream, included students, but also a support for students in excluded settings. The focus is primarily on questions concerning the assistants´ function during lesson periods, as well as on the extent of cooperation between assistant and teacher. These questions have been addressed by observing the work of 14 classroom assistants, using the methods of shadowing and interviewing. The results showed that the assistants´ help was used mainly with younger children, generally in assisting individual pupils. The older the children, however, the more time the assistant spent assisting the teacher. Special and mainstream education differed in regard to work profiles. From 11% to 15 % of the assistants´ time was spent waiting during activities. The reasons for this are discussed, as well as other areas of the assistants´ work and also areas for future development.

Cognition, Meta-cognition, and TOM as observed in various contexts
Adina Shamir, Bar- Ilan University, *Israel*
Zemira Mevarech, Bar- Ilan University, *Israel*

The main purpose of the present study is to examine cognitive, metacognitive, and Theory of Mind (TOM) behaviors of kindergarten children as observed during child-child and adult-child interactions. In particular, the study addresses the following research issues: (a) Finding an effective condition for examining meta-cognitive behaviors of young children and comparing its findings to those obtained in 'conventional' adult-child interviews; and (b) exploring the relationships between cognition and meta-cognition of young children (ages 4-5 years old) under different contexts, controlling for verbal ability and Theory of Mind (TOM) development. The present study addresses both issues. Participants were 32 Israeli children (ages 4-5 years old). Each child was diagnosed individually, using the following measurements: Recall test, meta-memory, verbal abilities assessed by a subtest of Kaufman inventory, TOM, and learning strategies and

reflection. The latter were examined in 'conventional' adult-child interviews, and in peer interaction situations. In addition, on the basis of CINDLE (Cambridge Independent Learning Development Evaluation; Whitebread et al., 2005), the kindergarten teachers evaluated each child's level of cognitive, emotional, motivational, and social competencies. The findings indicated significant, but moderate correlations between cognitive, meta-cognitive and TOM. The correlations ranged between .31 and .64, explaining less then 40% of the variances. Furthermore, all measures of learning strategies and reflection were significantly higher at the peer-interaction situation compared to the 'conventional' adult-child interview. The peer interaction context was found to be more effective then the adult-child interaction context even after controlling for verbal abilities and TOM development. The theoretical and practical implications of the findings will be discussed at the conference.

F 3
29 August 2007 17:00 - 18:20
Room: 0.87 Marx
Paper Session

Science education

Chair: **Mary Dawn Ainley,** University of Melbourne, *Australia*

Analogical reasoning and biology knowledge of 8th grade socially disadvantaged pupils
Erzsébet Antal, University of Szeged, *Hungary*

This paper presents the results of a study carried out in 2004 that aimed to assess (1) the level and the deficiencies of biology knowledge and (2) the development and the characteristics of analogical reasoning in 8th grade socially disadvantaged pupils in Hungary (N » 900) in the context of several background variables such as the attitude to subject, learning strategies and self-regulating learning. This study is closely linked to an earlier survey of 8th grade Hungarian urban students in 2001 (N = 220). In both cases the same instruments were used (a Verbal analogies test to assess inductive reasoning, a Biology knowledge test, a Biology analogy test and a questionnaire), thus it is possible to compare the performance and the characteristics of the two samples, with subjects of the same age, but coming from significantly different socio-cultural backgrounds. The results of the tests indicate that socially disadvantaged pupils have a very low level of biology knowledge and they show poor domain-specific and domain-general analogical reasoning. Their performance was much poorer (20-30%) than that of those who participated in the 2001 survey, from better social backgrounds. However, the proportions of the test results are similar in the two samples. The analysis of frequency distribution showed that the achievements of socially disadvantaged pupils were shifted to the lower scores, but the characteristics of the distribution curves were parallel in the two samples. The research suggests a clear link between social disadvantage and knowledge acquisition as well as the development of reasoning abilities. Confirming that cognitive development follows a universal tendency, the results help to create a special developmental program that targets analogical reasoning and biology knowledge for disadvantaged pupils.

Values, Beliefs, Norms And the Disposition to Protect Biodiversity - A Quantitative Survey With Young People in Chile and Germany
Susanne Menzel, Göttingen University, *Germany*
Susanne Boegeholz, Göttingen University, *Germany*

Which psychological factors are relevant to explain students' disposition to protect biodiversity? Do students in Chile and Germany differ in their disposition to protect biodiversity? Results of a quantitative questionnaire study related to these questions will be presented. The study was conducted with German (n=216) and Chilean (n=217) students aged 16 to 18. The underlying VBN (Value-Belief-Norm) Theory (e.g. Stern 2000) proved to be a powerful framework to explain dispositions to protect biodiversity on a local and a global scale. However, very different predictors prove to be relevant for Chilean and German students: While for Chilean students local phenomena and somehow egoistic constructs prove to be positive predictors, variables of a more universalistic and global nature show to be relevant for German students. Consequences for educational policies will be outlined and discussed.

Teaching across the subject boundaries of science and mathematics: The role of aesthetic understanding
Linda Darby, Deakin University, *Australia*

Science and mathematics are often closely associated during discussions about teaching and learning. This research explores the influence of subject culture as teachers negotiate boundaries between school mathematics and science. Such negotiation requires that a teacher understand the language, epistemology and traditions of the subject, and how these things govern what is appropriate for teaching and learning. Teachers are, in a sense, inducted into the culture of the subjects by way of their own experiences of doing, using, learning and teaching mathematics and science. Consequently, descriptions of a teacher's practice are enhanced by drawing on his or her experiences, ideas, beliefs and values about the subject areas within which they operate. In this presentation, the case for using aesthetic understanding as a construct to provide insight into the place of subject culture in teaching is developed from classroom observation, videoing and interviews with six secondary mathematics and/or science teachers. The presentation outlines the degree to which, and in what manner, the teachers have an aesthetic response as part of their personal response to the subject cultures by exploring three elements of aesthetic understanding: the compelling and dramatic nature of understanding (teachers' motivations and passions); understanding that brings unification or coherence (relationships between disciplinary commitments and knowing how to teach); and perceived transformation of the person (teacher identity and positioning). Implications for supporting teachers in negotiating subject boundaries successfully are discussed.

Some aspects of students' ideas of water
Dal Burckin, Istanbul Technical University, *Turkey*

The goal of this study is to investigate high school students' ideas of the water cycle. A total of 120 high school students, of mixed ability and gender from 4 inner city schools in France were involved in the study. A qualitative and quantitative methodology was used for this investigation. Results indicate that students understand hydrological concepts but most of them lack the cyclic and dynamic ideas of the system. They possessed many preconceptions and misconceptions about the water cycle. Most of the students were aware of the atmospheric part of the water cycle, but ignored its groundwater part. Implications of these results emphasize that making local

connections, especially in activities such as natural cycles and the context of their influence on people's daily lives, should be included in science curricula.

F 4
29 August 2007 17:00 - 18:20
Room: 7.14
Paper Session

Language education

Chair: **Marianne Nikolov,** University of Pécs, *Hungary*

How can we improve students' literacy? A one-year longitudinal study on the use of a non-traditional approach to developing a Secondary 1 curriculum in Chinese language in Hong Kong
Shek Kam Tse, The Univsersity of Hong Kong, *Hong Kong*
Ference Marton, Göteborg University, *Sweden*
Ka Yee Elizebeth Loh, The University of Hong Kong, *Hong Kong*
Pui Man Pakey Chik, The University of Hong Kong, *Hong Kong*

Promoting students' literacy—the ability to read and write has been one of the key foci in current curriculum reforms in Hong Kong, as in elsewhere in the world. In this paper, we examine the effectiveness of an innovative one-year curriculum on improving Secondary 1 students' literacy in Chinese language in Hong Kong. The design of such curriculum was guided by the Theory of Variation and aimed to provide a more focused experience for students to develop their reading comprehension and their capability to express themselves in writing. Unlike the predominant practices which are text-based and focus on a great number of independent short passages or simplified literature in the Chinese language curriculum, it is based on novels, including fictions and non-fictions. Specifically, it focuses on helping students to differentiate the language application and the uses of reading skills in a wider context of fiction versus non-fiction. Students' sharing of their own opinions and interpretations of particular episodes in the novels was also encouraged in the lessons and an on-line forum set up for their after-school discussions. The results indicated that in the three participating schools, students who underwent the new curriculum did not only score significantly higher in the language abilities test administered after the curriculum implementation, than those who did not, but their gain score '. These findings therefore support the conclusion that the reading of novels and contrasting various interpretations among the students in the Chinese language curriculum is an effective, if not the most effective way, in fostering students' literacy.

Investigating the double deficit hypothesis in learning to read Greek: findings from grade 1
Timothy C Papadopoulos, University of Cyprus, *Cyprus*
Maria Constantinidou, Cyprus Ministry of Education and Culture, *Cyprus*
Panayiota Kendeou, Cyprus Pedagogical Institute, *Cyprus*
Maria Koushiou, University of Cyprus, *Cyprus*

The aim of the present study was to detect whether there was a naming speed deficit as an independent core feature of reading difficulties or as an associated feature of a phonological deficit in a Greek speaking sample. A population of 276 Grade 1 children participated in the study. The

following tests were administered to form the participating deficit groups: Rhyming (tapping broad phonological awareness), Phoneme Elision, Sound Isolation, Blending, and Initial Sound Alliteration (tapping narrow phonological awareness) and Naming of Letters and Digits. Reading speed and accuracy of real and nonwords, spelling, and passage comprehension were used as the dependent variables. Verbal and non-verbal ability as well as parental education level and age were used as group matching variables. To test the Double Deficit Hypothesis (DDH) four groups were formed: a Double Deficit group (DD; n=22), a Phonological deficit group (PD; n=32), a Naming deficit group (ND; n=33), and a Control group exhibiting no deficits (CnD; n=189). The bottom 20th quartile of the sample mean on the composite scores of the phonological and of the rapid-naming measures was used as criterion to form the three deficit groups. Consequently, children in each of the single-deficit groups performed within normal range on the other measure. Results showed that all three deficit groups performed significantly lower than the CnD group in all the dependent measures. The same results emerged when the DD group was compared to the single deficit groups. Surprisingly enough, the only group difference that was observed between PD and ND groups was on one of the spelling tasks, a finding that was not expected on the basis of previous research testing the DDH in language with salient orthographies (e.g., Wimmer et al., 2000). Discussion centres on the implications of these findings in languages with transparent orthographies such as Greek.

Acquiring L2 vocabulary from reading-and-writing tasks.
I-Hsin Liu, Katholieke Universiteit Leuven, *Belgium*
Lies Sercu, Katholieke Universiteit Leuven, *Belgium*

The implicit acquisition of vocabulary through reading in a foreign language has been much researched. Far fewer studies, if any, have focused on differences in noticing and intake while doing reading-and-writing tasks. Reading-and-writing tasks require learners to write a text on the basis of the input materials they have read. In this presentation, we report on an investigation that was carried out amongst Flemish secondary school students of English as a foreign language and which focused specifically on the full or partial incorporation in a written text of selected writing-task relevant target words in the input materials. Our findings, obtained from a combination of product and process data, suggest a difference in noticing and intake of the target vocabulary in the five different conditions that is influenced by learner's characteristics such as vocabulary size, working memory capacity and speed of lexical access. Our product data include the written texts, a lexical noticing test and receptive and productive vocabulary tests. Our process data include stimulated recall interviews in which a number of respondents report on the processing strategies they used while doing the reading-and-writing task or the reading task. We also relate our findings to a number of other learner characteristics mentioned above. We will interpret our findings in the light of the Noticing Hypothesis (Schmidt, 2001), the input enhancement research, the Output Hypothesis (Swain, 1985), and the relationship between reading and writing (Hayes, 1996; Kellogg, 1996), ask what it is learners pay attention to when confronted with reading and reading-and-writing tasks, and discuss what instructional implications follow from our findings.

Learning communication and identity in Swedish special schools – a sociohistorical and classroom interactional analysis
Sangeeta Bagga-Gupta, Education, Örebro University, Sweden, *Sweden*

Understandings vis-à-vis inclusion and "one school for all" are implicitly (if not explicitly) based upon the notion of concrete physical spaces cohabited by children with a range of diversity markers. How this diversity is socially organised and dealt with at an everyday level is not

commonly the centre of focus in research. This paper has two foci and reports findings from an ethnographic study of the five special state schools for the deaf and hard-of-hearing in Sweden. These schools have remained segregated since their inception nearly 200 years ago. This is unique since their segregated organisation has been argued for in different ways during the radical shifts vis-à-vis communication "methods" related to literacy and normalcy that deaf education has witnessed since the end of the 19th century. This paper will firstly, at a macro level, explore how diversity has been conceptualised and operationalised through a sociohistorical analysis of national curricula that have guided these particular school settings. Secondly, the paper will make an attempt to understand aspects of heterogeneity in the categories of pupils and adults who are members of these schools at the beginning of this century. Thus the following types of questions will be focused: How are membership categories operationalised? What kinds of communities are co-constructed in these special school arenas? How is heterogeneity conceptualised and attended to in everyday life in the primary grades of these schools? What is the nature of classroom activities, communication and social interaction in these grades? The empirical data comprises of field notes and videotaped material of mundane interaction inside and outside classrooms of grades 2, 3 and 4 in these state schools, informal discussions with adults and children in these arenas, texts used and (re)produced in the classrooms, and local and national policy texts with special relevance to these schools.

F 5
29 August 2007 17:00 - 18:20
Room: 4.95
Paper Session

Science education

Chair: **Philip Adey,** Kings College London, *United Kingdom*

"I am right and you are wrong!" - Analysing the management of disagreement and conflict in collaborative learning
Anniken Furberg, University Of Oslo, InterMedia, *Norway*
Hans Christian Arnseth, Network for IT-Research & Competence in Education, *Norway*

This study examines the structures and functions of disagreements in collaborative activities in science education. The empirical setting is a project where secondary school students and their teacher used the web-based science program Viten.no. We report on interaction analysis of one sequence of student talk where their contradictory accounts of the relationship between DNA, proteins and genes, are topicalized in their talk. We analyse in detail how they engage in argumentation; how they make claims, provide accounts for their claims and resolve or fail to resolve disagreements and misunderstandings. Our findings indicate that the disagreement between the students is not only about how to make meaning of the subject matter, but also a process where identity and validation of knowledge is at stake. Further, the interaction between the students and the teacher differs from an IRF-structure often embedded in such interactions. The teacher avoids validating the students' claims. As a consequence, the students are made accountable for validating each others claims. The students deal with this situation by holding Viten.no as the main source of evidence for validating their opposing claims. Another finding is that the web based learning resource structures the students' argumentation despite of not being

used physically in the situation. Finally, the analyses show the ambiguity of disagreements. On the one hand, the disagreement seems to convey students into giving increasingly complex and accurate accounts, but on the other hand the students get stalled in a one-dimensional right or wrong situation. Our findings are discussed in relation to how disagreements and conflicts can be productive in learning activities.

Implementing embedded assessment to identify student's misconceptions in science
Yaron Doppelt, University of Pittsburgh, LRDC, *Israel*
Christian D. Schunn, University of Pittsburgh, LRDC, *USA*
Eli M. Silk, University of Pittsburgh. LRDC, *USA*

The education system's purpose is to advance pupils to better academic achievements. But, it is rare to find a teacher claiming that the ideal outcome of learning is 100% of success in the tests. In this research we present the implementation of embedded assessment aimed at identifying misconceptions. The assessment's items were selected from the literature which is dealing with misconception in science. The instrument was tested with 1324 pupils who studied with 19 teachers in 15 middle-schools in a public school system of a mid-sized city. The 19 teachers have participated in a 5 workshops. Each workshop lasted five hours. The workshops were distributed while the teachers have implemented the learning module in their classes. Teachers were engaged in an active learning process similar to the process their pupils were going to experience. Teachers, researchers, and teachers' leaders from the school districts have collaborated and shared ideas in order to create a community of learners. Creating a community of learners created a learning environment which allowed teachers to share their experiences with other teachers and to discuss content knowledge as well as pedagogical content knowledge. All the workshops were videotaped and the researchers preformed 220 hours of observation in the classrooms during each of the two years of the module's implementation. The teachers adopted the developed tool for assessing their pupils' achievements. Four characteristics were found to be effective for teachers' in-service training. The PD in this study created a learning community which included teachers, teachers' leaders, and researchers. Distributing the workshops over the implementation's period enabled the community to analyze case studies that teachers brought from their actual classroom's environments. These analyses contributed to a deep learning process that teachers have experienced. Especially the teachers' content knowledge in science and pedagogical content knowledge was enhanced.

Learning about time through multiple environments and according multiple epistemological and pedagogical perspectives
Katerina Plakitsi, University of Ioannina, *Greece*
Vasilis Kokkotas, University of Athens, *Greece*
Panagiotis Piliouras, University of Athens, *Greece*

Contemporary science and culture both challenge the monothematic approach of epistemology and pedagogy of positivistic empiricism and functionalistic formalism. If we follow the approach of Polanyi about tacit knowledge, we will admit that articulated thought involves mechanisms of irrational unpredictable elaboration (Polanyi 2002). On the other hand learning is accomplished through the exchange of semiotic systems and communication in informal and figurative language (involves socialized humanity and its culture). As we have also tried to prove reason is not a closed system of rules but consists in the autonomous self-examination of reflexion (Plakitsi, Kokkotas 2003), whose substantiation does not consists in self-proved rules but, as Willke writes, in thematization (Willke 1996). (This in turn posits the interdisciplinary aspect of learning) In the

case of time, as one of the fundamental categories of thought (Piaget 1969, Ogborn & Mariani 1995), we carried out a researching program for three years in Athens. In the first phase of our program, we recorded pupilsb□™ conceptions of time, following the Piagetian method of clinical interview. At the second phase of our program we expanded our study to the social constructivist field; and we tried to help pupils to scaffolding their ideas about time. We designed a research program to study a curriculum including teaching strategies adapted to children of 9-10 years. At the third phase we created open learning environments (Roth, 1995), and we used learning strategies, such as dialogues (Lemke, 1990), argumentation (Toulmin, 1958, Walton, 1996), academic controversies (Johnson & Johnson, 1995) etc. Pupils exchange their ideas, they were telling stories about time, and they argued using many types of justifications. They challenged each other; but also they negotiate their ideas and make a synthesis that made meaning to them. The first outcomes of this project show off the necessity of integration through inter-disciplinarity.

Students' reasoning approaches to multi-criteria decision-making situations in the context of socio-scientific issues

Nicos Papadouris, Learning in Science Group, University of Cyprus, *Cyprus*
Constantinos Constantinou, Learning in Science Group, University of Cyprus, *Cyprus*

This paper reports on an empirical study that is targeted at identifying and documenting the various reasoning difficulties encountered by students while processing information in the context of decision-making situations that require multiple criteria. Data were collected through interviews with 18 individual students (9 sixth-graders and 9 eighth-graders). We have used tasks concentrating on the fictitious selection of the most appropriate site for a new power plant. Data analysis demonstrates some prevalent reasoning patters. One of these includes distorting the available evidence through eliminating certain aspects of information and selectively attending to a limited portion of the data. Another common approach involves directly comparing information without adjusting for the variability relevant to the diverse metrics used to express raw data. Finally, a third approach involves making a decision on the basis of the rankings of the alternative solutions across the various criteria. We demonstrate that these approaches are the outcome of a number of prevalent reasoning difficulties. Two of these difficulties include students' failure to appreciate the need to take into account the entirety of available data and their lack of awareness with respect to the confounding that stems from the variability in the metrics used to express raw data. The information provided by this study enlightens school students´ attempts to make decisions in complex situations and highlights some of the reasoning strategies that are spontaneously activated by the students. The findings could be used to inform any attempt to devise learning materials for developing students' reasoning skills in dealing with multi-criteria, decision-making situations.

F 6
29 August 2007 17:00 - 18:20
Room: -1.63
Paper Session

Educational effectiveness

Chair: **Hans Gruber,** Universität Regensburg, *Germany*

Factors pertaining to the choice of academic vs. vocational upper secondary education – A longitudinal study of the development of the learning to learn skills of Finnish students from sixth grade to upper secondary education
Sirkku Kupiainen, University of Helsinki, *Finland*
Jarkko Hautamaki, University of Helsinki, *Finland*
Markku Niemivirta, University of Helsinki, *Finland*

The paper is based on a longitudinal study which forms part of a more comprehensive ten-year-old Finnish research project on learning to learn, or the cognitive and affective factors central to the application of existing skills to novel tasks and to new learning (for the framework see: http://www.helsinki.fi/cea/dokumentit/framework.pdf). The data for the study was collected at three time points during the school carrier of the whole Finnish speaking age cohort of a larger town in Southern Finland. The students' learning to learn skills were measured at the end of primary, the end of lower secondary, and the second year of upper secondary education, i.e. when the students were 12, 15 and 17 years old, respectively (N=2001/1890/1021). The research question rises from the structure of the Finnish education system, where students have to choose after the comprehensive school between two very differing types of education, the (academic) high school and vocational schools or institutions. The choice is de facto based on school achievement and interest but reflects strongly the home background of the students, and girls outnumber boys among those choosing the academic high school. The paper focuses on the differences in—and the differing development of— the measured cognitive abilities and affective factors between students who chose the academic high school and those who chose vocational education, from sixth grade to upper secondary education, taking into account students' gender and socio-economic background (parents' education).

Teaching for the promotion of higher-order thinking and the enhancement of students' critical thinking
Miri Barak, Technion, *Israel*

This longitudinal case-study aimed at examining whether purposely teaching for the promotion of higher-order thinking may enhance students' critical thinking (CT). The experimental group (n=57) consisted of science students who were exposed to teaching strategies designed for enhancing higher order thinking skills. Two other groups: science (n=41) and non-science majors (n=79), were taught traditionally, and acted as control. By using critical thinking assessment instruments, we have found that the experimental group showed a statistically significant improvement on critical thinking skills components and disposition towards critical thinking subscales, such as truth-seeking, open-mindedness, self-confidence, and maturity, compared with the control groups. Our findings suggest that if teachers purposely and persistently practice higher order thinking strategies e.g., dealing in class with real-world problems, encouraging open-ended

class discussions, and fostering inquiry-oriented experiments, there is a good chance for a consequent development of critical thinking capabilities.

Teaching effectiveness research in the last decade: Role of theory and research design in disentangling meta-analysis results
Tina Seidel, IPN - Leibniz-Institute for Science Education, *Germany*
Richard J. Shavelson, Stanford University, *USA*

This meta-analysis summarizes teaching effectiveness studies of the last decade and investigates the role of theory and research design in disentangling results (Seidel & Shavelson, revised). Compared to past analyses based on the process-product model, a framework based on recent cognitive models of teaching and learning proved useful in analyzing studies and accounting for variations in effect sizes. While the effects of teaching on student learning were diverse and complex, they were fairly systematic. We found the largest effects for domain-specific components of teaching - teaching most proximal to executive processes of learning. By taking into account research design, we further disentangled meta-analytic findings. For example, domain-specific teaching components were mainly studied with quasi-experimental or experimental designs. Finally correlational survey studies dominated teaching effectiveness studies in the last decade but typically contained components more distal from the teaching-learning process.

Exceptional teachers working in difficult learning environments: narratives of effectiveness.
Annemarie Hattingh, University of Pretoria, *South Africa*

Teaching in the age we live in is a demanding and complex task. Learning environments are always challenging, though some are more so than others. A difficult learning environment in this study was viewed as a poverty stricken school and its community; where learning resources such as text books and equipment for science teaching barely existed and where a culture of learning was fragile – a harsh reality for many in the developing world. While many teachers despair and try to survive on a daily basis, some teachers excel in developing potentials for learning despite difficult working environments. Why? I problematised this intellectual puzzle through two research questions: · What are the personal dispositions of effective teachers teaching science in constraining learning environments? · Which patterns of innovation and creativity emerge in pedagogical practices of exceptional teachers? Using the teacher as the unit of analysis, the theoretical frame is situated in teacher effectiveness literature. Moving beyond the criteria of student achievement or student progress I examined the work of Campbell, Kyriakides, Muijs & Robinson (2004) regarding values driving educational effectiveness. Three in-depth case studies were conducted on South African national award winning high school science teachers working in poor rural schools. Findings show that these teachers do not exactly fit a 'standardised image' of experts who work in more favourable conditions. Their asset-based disposition (as opposed to a deficiency-based one) hosts core values underpinning their pedagogical, personal and inter-personal decision-making. It also foregrounds how these teachers take valued pedagogical principles such as, for example, curriculum relevance, to a new level when they implement indigenous examples and beliefs of local cultures to demystify science concepts.

F 7
29 August 2007 17:00 - 18:20
Room: 0.100A
Paper Session

Creativity

Chair: **Johannes Hans Van Luit,** Langeveld Institute, *Netherlands*

Creativity in crisis: Fixation in secondary school students (aged 11-16 years) Design & Technology work
Ros McLellan, University of Cambridge, *United Kingdom*
Bill Nicholl, University of Cambridge, *United Kingdom*

Design & Technology (D&T) educators in the UK face a 'crisis in creativity': design skills (the generation and development of design ideas) are poor relative to making skills (manipulation of materials such as wood), resulting in outcomes lacking creativity. Little research has examined the process(es) through which students generate design ideas and the role played by teachers in this, but unless this is understood we will be unable to develop creative potentials for learning in D&T. Drawing on the creative cognition literature, (cognitive processes involved in idea generation), we take the concept of 'fixation' (the difficulty in generating novel ideas, due to imagination being 'structured' by pre-existing knowledge) and apply this to design ideas generated by students (aged 11-16 years) in D&T; asking: (1) How does fixation manifest in students' D&T work, and (2) What teacher practices contribute to fixation. Data were gathered in 6 secondary schools over a nine-month period during the preliminary phase of a research and intervention project. Semi-structured interviews were conducted individually with D&T teachers (N=14), and with focus groups of students aged 11-16 (N=126). Lessons were observed (N=10), and samples of student work and relevant documents were gathered and analysed. Fixation was rife. Typical design ideas were 'stereotypically' similar to each other, based on images from popular culture. Students had a strong desire to make the first design they thought of and often struggled to produce more than one design idea. A number of teacher practises contributed to fixation, including strategies related to analysing products, the presentation of design briefs and socio-cultural dimensions of the classroom. These can be explained via the effects they have on normative cognitive processes. Fixation is not pre-determined and default tendencies can be overridden through appropriate stimulation. Hence we argue the role of the teacher is key.

Creativity, problem solving and feeling: Enhancing potential for learning
Carol Aldous, Flinders University of South Australia, *Australia*

Learning in its fullest sense involves individuals engaging with fresh challenge, solving novel problems and developing new ideas. But how are new ideas created? From where do they arise? Such questions are central to research in creativity and fundamental to conceptions of learning. Attending, not only to cognitive processes but also to non-cognitive ones such as feeling and intuition when solving novel problems in mathematics, is pointing to a way in which answers to such questions may be found and the potential for learning increased. A study of 405 middle school students solving two novel problems in the Mathematics Challenge for Young Australians, found that individuals using a feeling or free- flowing approach to reasoning were more likely to be successful in reaching a solution than those who did not. Feeling cognitions were found to have both a direct and indirect effect on the generation of a solution depending on whether mainly

spatial or verbal processing was required. Data were tested by full structural equation modelling with maximum likelihood estimation procedures using AMOS graphics version 4.01.

Creative writing: the relation between students' processes and final products
Talita Groenendijk, University of Amsterdam, *Netherlands*
Tanja Janssen, University of Amsterdam, *Netherlands*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Huub van den Bergh, University of Amsterdam, *Netherlands*

The aim of this study was to examine students' creative writing processes, and to relate their processes to the quality of the final creative product. Our main question was whether different creative processes lead to different results. Our data consisted of 95 poems and stories, written by 19 Dutch and Belgian students (11th graders) under experimental conditions. Each student wrote 5 texts on the computer, in response to specific tasks. These texts were rated holistically by a jury of seven experienced judges. Interrater-reliability was high (> .80). During task execution, we collected data on students' writing activities by using keystroke logging. The linear output of the keystroke logging computer programme was coded and analyzed. The occurrence and the duration of processes (e.g., text producing, pausing, several types of revising) were mapped out. Next, we applied factor analysis to uncover different writing approaches of students (in terms of combinations of processes used). Finally, we examined whether students' approaches were related to the jury's scores of their poems and stories. Findings showed that typical combinations of processes can be found among 16-year old creative writers. We found successful and less successful combinations of processes, in view of the resulting products. For instance, a linear writing process with little or no revisions of already written text, tended to result in weak products. Good products, on the other hand, were often the result of much revising and rewriting on the part of the student, especially when the student revised on a global text level (e.g. rewriting whole verses of the poem, instead of just substituting one word). We conclude that creative production involves much re-thinking, evaluating, and revising. It requires hard work; 'divine inspiration' is not enough. In follow-up studies, we intend to use these findings for developing and testing effective, process-oriented learning arrangements.

Novel avenues for learning: Children's experiences of co-creation and a Playful Learning Environment
Marjaana Kangas, University of Lapland, *Finland*

This paper reports the outcomes of a pilot study where children, aged 7 to 12 (N = 68), had an opportunity to study curriculum-based topics in an informal setting. The children's learning activities were extended from the classroom to an innovative playground, the Playful Learning Environment (PLE), enriched by technological tools. Curriculum-based learning was thus intertwined with play and digital games in the PLE. The children studied topics first in the classroom: they oriented themselves to the learning content and co-created a fictional "what if" game world for the playground. Next, they played the game on the playground, and then finally reflected and elaborated on the topic back in the classroom. The objective of this study was to examine the children's experiences of the learning activities, especially within the co-creative processes that involved the designed game worlds. From the socio-cultural perspective, co-creation in this case refers to knowledge co-construction that highlights creativity, narrativity, and imaginativeness. This study focuses on learning in an informal setting using novel learning methods and adhering to the basic idea of the PLE: offering children an increased number of opportunities for play and bodily activities in the school setting. The study builds on design-based

research and intends to produce new theories and practices for PLE contexts. The research data was analyzed qualitatively, and it consists of interviews with children and video material of co-creative processes. The results indicate that the children considered learning through co-creation and turning fact into fiction in groups a fascinating way to learn new things, to practice group work, and to use one's imagination in the school setting. They felt that refining and elaborating ideas as a group was inspiring but also somewhat strenuous. During the co-creative learning processes the children encountered five types of challenges: physical, intellectual, social, collaborative, and emotional.

F 8
29 August 2007 17:00 - 18:20
Room: 0.89 Jedlik
Paper Session

Metacognition

Chair: **Csaba Csíkos,** University of Szeged, *Hungary*

Influence of task and goal orientation on the generation of information seeking questions
Koto Ishiwa, Universidad de Alcala, *Spain*
Vicente Sanjose, Universidad de Valencia, *Spain*
Jose Otero, Universidad de Alcala, *Spain*

Questions addressing knowledge deficits, that is, questions seeking information that could solve these deficits, are especially important in educational settings. We conceptualize the generation of information seeking questions as a process involving a certain input, a processing goal, and obstacles to achieve this goal . Given a certain textual input, goals and obstacles are closely related. Goals may be manipulated by setting different tasks and this should have an influence on the obstacles found and the questions asked. Goal orientation is another variable that may influence reading goals. We present results of an experiment where we manipulated task (reading for understanding or reading to solve an easy problem) and induced goal orientation (mastery vs. performance) in order to look at the effect on question generation. The questions asked by students were classified into three categories according to the reason for their generation: (a) knowledge of entities, (b) justification of entities, (c) consequences of entities . Both task and goal orientation had a significant effect on questions asked. Also there was an interaction between these variables. These results can be interpreted as evidence of different readers' internal representations depending on task and goal orientation

Secondary students' adaptation of study strategies across tasks and subject domains
Hein Broekkamp, University of Amsterdam, *Netherlands*
Bernadette Van Hout-Wolters, University of Amsterdam, *Netherlands*

A contextual approach is taken to investigate study strategies as used by students in regular settings of secondary schools. By closely connecting qualitative descriptions of students' use of study strategies to a description of the individual and environmental context in which they use these strategies, we aim to explain their strategy choices. Moreover, we attempt to describe the metacognitive processes that students use in order to adapt their strategy choices to the demands

and conditions of given study tasks. Multiple case studies are currently performed in two schools. In each school, three tenth-grade classes engaged with different subject domains (history, geography, biology) are followed as students perform two types of study tasks that are common to Dutch secondary education – a "test preparation study task" and a "project based study task". Various types of data are collected, including field notes of lessons observed, instructional-learning materials and audio protocols of interviews and students thinking aloud while working on assignments. All of these data are systematically archived, annotated, and/or transcribed, depending on their expected value for the first of two major goals of this study: providing rich descriptions of interesting examples of students' strategy motives and ways of adapting strategies to specific contexts. These descriptions are given both at a concrete level and an analytical level, the latter drawing from the theoretical model of strategy adaptation, which we have based on a literature review. The second major goal of this study is to describe students' and teachers' reactions to the concrete descriptions of examples in so called feedback sessions. We consider their reactions as a validation of the variables and language used in the model. Indeed, our ultimate goal is to develop a theoretical model that helps teachers and students to describe and reflect upon their own educational practice.

Metacognitive experiences and skills in a collaborative students' interaction
Tuike Iiskala, University of Turku, *Finland*
Marja Vauras, University of Turku, *Finland*
Erno Lehtinen, University of Turku, *Finland*
Pekka Salonen, University of Turku, *Finland*

Metacognition is traditionally understood as a person's own knowledge about cognition and as monitoring and regulation of cognitive processes. Thus, the focus has been on an individual's metacognition. Although recently more attention has been shifted to social aspects of metacognition rather than merely understanding it from the perspective of an individual, the empirical evidence is still scarce. Thus, our aim is (1) to explore metacognition, especially metacognitive experiences and skills which concern ongoing processes, during a collaborative students' interaction and (2) to elaborate methods for analyzing metacognition during the interaction. Four high-achieving pairs, thus eight students, participated in this study. The students in the pairs were ten years old. Every pair solved during 16 one hour sessions mathematical word problems of different difficulty levels with the help of the computer-supported mathematical learning game. Thus, the data consists of altogether 285 problems during 64 hours. Working sessions were videotaped, and a stimulated recall interview was conducted. The verbal communication during all sessions was transcribed, and nonverbal communication written down. The analysis is based on the interaction analysis, in particular, on preoccupational analysis. An application of the interaction flowchart is used (cf. Sfard & Kieran, 2001a, 2001b). Typical examples of the pairs' collaborative interaction is shown. As results, we found metacognition which do not imply only the student's own or the other student's cognitive processes but indicate also shared metacognitive experiences and skills during the problem solving process. This kind of shared metacognition seemed to sustain mutual thinking among the student pair. To conclude, we regard as important to expand metacognition study to consider metacognition in social systems, like in collaborative learning situations, which are qualitatively different than individuals working.

If we teach students how to learn will they remember more? : The influence of retrieval training on recall in L2 vocabulary learning.
Michael Lawson, Flinders University, *Australia*
Mirella Wyra, Flinders University, *Australia*

The mnemonic keyword method has been proved to be a successful and useful technique in foreign language learning. This study examines the effects of manipulation on the internal sections of the keyword method focusing on the bidirectional retrieval training. Learners' ability to make images, measured using Vividness of Visual Imagery Questionnaire and Ability to Make Images Questionnaire, is also examined in relation to the vocabulary recall in both directions. Grade 7 students studying Spanish as a second language learned 22 Spanish-English word pairs. Data on recall performance was gathered on five occasions and was analysed using the Hierarchical Linear Modelling procedure. The retrieval training was a significant predictor of the bidirectional recall as was the ability to make images

F 9
29 August 2007 17:00 - 18:20
Room: 3.67 Békésy
Paper Session

Motivational, social and affective processes

Chair: **Anastasia Efklides,** Aristotle University of Thessaloniki, *Greece*

The relationship between motivation, deep information processing and obtaining a doctoral degree
Marjon Bruinsma, University of Groningen, *Netherlands*
Ellen Jansen, University of Groningen, *Netherlands*

We investigated whether motivation affected deep information processing (DIP) and the time to obtain a doctoral degree. 567 students filled out a self-report questionnaire three times. Achievement data were obtained from departmental administrations. Covariance analyses showed that students who found the study interesting used more DIP in their first-year; however DIP did not affect 1st-year-achievement. Further, students with higher expectancy and interest used more DIP in their second year; however, DIP had a negative affect on 2nd-year-achievement. Finally, students with higher expectancy, affect and DIP, obtained their doctoral degree earlier. Apparently, motivation affects deep-information-processing and both short and long-term outcomes.

Emotional and motivational effects of decorative pictures in knowledge communication
Alwine Lenzner, University of Koblenz-Landau, *Germany*
Wolfgang Schnotz, University of Koblenz-Landau, *Germany*
Andreas Müller, University of Koblenz-Landau, *Germany*
Holger Horz, University of Koblenz-Landau, *Germany*

Studies on text and picture comprehension traditionally focus on effects of instructional pictures. Comparably little attention has been given to the effects of decorative pictures in knowledge communication. The aim of this study was to investigate how decorative pictures in learning

materials used in physics classes influence students' mood, motivation, and performance. Therefore, an experiment was conducted with students from secondary school (7th and 8th grade). Subjects were randomly assigned to a two-factor design with the factor "illustration with decorative pictures" and the factor "illustration with instructional pictures". Participants were asked to read a text on physics. Before passing the learning material to the students', prior knowledge, intelligence and individual interest in physics was measured in order to control their influence on the results. Achievement emotions, motivation, effort (learning time), and cognitive load were measured during reading. Afterwards, the learning performance was assessed using a multiple-choice knowledge test. This test consisted of two different scales, one for memory performance (recall scale) and one for transfer knowledge (comprehension scale). Results indicate that decorative pictures are not only 'seductive details', but have emotional and motivational effects. If these pictures are attractive and evoke high arousal they are beneficial for learning. In conclusion, illustrating learning materials with decorative pictures provides a viable method to increase learning results through a simple change in the learning environment. Practical implications for the design of learning materials are discussed.

The role of goal orientation in learning quantitative research methods
Pertti Vaisanen, University of Joensuu, *Finland*
Harri Pitkaniemi, University of Joensuu, *Finland*

The purpose of the present study was to examine how general and domain-specific goal orientations, general self-efficacy, self-perceived course-specific competence, expectancies of success, and learning efforts are interrelated, and their impact on cognitive and affective learning outcomes in applied statistics for undergraduate students (N = 160). The data was collected in three phases of the course 'Quantitative Research Methods 1' designed for teacher education students in an eastern Finland university. Using Skaalvik's (1997) and Elliot and Church's (1997) instruments the students' general goal orientations were measured, as well as their perceptions of themselves as statistics learners using a 30-item Likert-type inventory (Students' Perceptions of Themselves as Learners of Statistics, Väisänen et al., 2004) at the beginning of the course. Half-way through the course, the students' domain-specific goal orientations were measured using the same instruments as in the beginning, but now students were instructed to focus on this specific course when responding. In the last phase of the course, students responded to an instrument investigating their learning efforts and affective learning experiences (a Likert type 45-item questionnaire Learning Process and Affective Outcomes, Väisänen et al., 2004). The course grade and self-evaluated success were used to indicate the cognitive learning outcomes. The measurements proved to be reliable with reasonably high reliability estimates ranging from .70 to .88 when measuring goal orientations and .79 - .91 in the other areas. Multitrait-multimethod correlational analyses, ordinary zero-order correlations and factor analyses lent support to the construct validity as well as to the concurrent and discriminant validity of the instruments. Results identified three clusters of students who were labelled Avoidance oriented, Performance–Learning oriented and Learning oriented. Different profiles of study success and stability of group membership were apparent when comparing general and domain-specific goal orientations. Supporting previous research, task and mastery orientation best predicted cognitive outcomes.

Academic interest as identity regulation: Why girls turn away from science
Ursula Kessels, Freie Universität Berlin, *Germany*

Our research is based on the assumption that the development of academic interests plays a crucial role for adolescents' identity regulation in general. The present study focuses on explaining why

many girls turn away from science. It is proposed that the stereotyping of physics as a masculine domain makes stronger engagement in physics threatening for female adolescents, as it endangers their developing identity as "woman-to-be". Following this line, it is suggested that one reason why girls abstain from physics might be that they fear that the ascription of any liking for physics will reduce the extent of their being perceived as feminine. The present study tested whether girls reacted to highly positive feedback concerning their physics' abilities in a compensative manner: instead of accepting the positive feedback, we expected them to underline their femininity. Boys, however, who were confronted with the same highly positive feedback, were expected to accept the feedback as is. The study used n=135 9th graders in a randomized control group design. Students received false feedback after having worked on physics tests: half of participants received highly positive feedback, the other half received average feedback. The need to demonstrate one's own gender identity was operationalized as follows: Students were asked how likely they were to read several different articles, half of them about science career options, half about typical sex-typed teenager themes (different versions for girls and boys). Results supported our hypothesis: While boys demonstrated relatively more interest in articles dealing with science career options after highly positive feedback on their physics ability (compared to average feedback), this pattern could not be detected with girls. These results can be taken as evidence that girls reject the prescription of high ability in physics and underline their femininity instead.

F 10
29 August 2007 17:00 - 18:20
Room: 0.83 Eötvös
Paper Session

Motivation

Chair: **Sanna Järvelä,** University of Oulu, *Finland*
Exploring the nature of achievement goals through their relations with school-related control beliefs
Teresa Goncalves, Polytechnic Institute of Viana do Castelo, *Portugal*
Marina Serra de Lemos, University of Porto, *Portugal*

Achievement goals have been related to different patterns of behavior, cognition and affect, which may enhance or debilitate learning and performance (eg. Dweck & Elliott, 1983; Elliot & Harackiewicz, 1996). In particular, mastery and performance goals have been differentially related to perceived competence and to capacity versus effort attributions. However, while mastery goals have been defined similarly and have evidenced consistent effects on outcomes, there is still some controversy about a distinction between approach- and avoidance-performance goals and their differential effects on motivation and achievement (Harackiewicz et al., 2002; Midgley et al., 2001). The aim of the present study was to highlight the nature of the different achievement goals through the exploration of their relations with a multidimensional concept of perceived competence, which separately considers general control-expectancy beliefs, agency beliefs and attributions for different causes (Skinner et al., 1988). Participants were 484 9th grade students who completed the personal goals subscale of PALS (Midgley et al., 2000) and the CAMI instrument (Skinner et al., 1988). Correlational analysis showed that mastery goals were consistently related to general control-expectations, perceived access to effort, to teachers' help, to luck and to capacity, as well as attributions to effort, i.e., a positive perceived-control profile.

Performance-approach and avoidance goals evidenced very similar relations with perceived ability and with attributions of results both to ability and luck, i.e., a less positive perceived-control profile. In sum, results support a clear distinction between mastery and performance goals (both approach and avoidance) as they hold differential relations with control-beliefs profiles. Moreover, results showed that approach- and avoidance-performance goals share very similar relations with a negative perceived-control profile.

Situational changes in classroom-specific need for closure
Teresa DeBacker, University of Oklahoma, *USA*
H Michael Crowson, University of Oklahoma, *USA*
Barbara Greene, University of Oklahoma, *USA*
Raymond Miller, University of Oklahoma, *USA*

Need for closure entails the twin desires to achieve certainty and avoid confusion and ambiguity (Kruglanski, 1989). Need for closure is of interest to educators as it seems plausible that students who are characterized by a high need for closure may prematurely curtail cognitive processing during learning or problem solving ("seizing"), cling to prior knowledge even in the face of conflicting information ("freezing"), or show excessive reliance on perceived authorities as sources of information. General need for closure is known to have both trait-like and state-like qualities. Our results suggest that classroom-specific need for closure also has state-like qualities, as students' reported need for closure changed across the semester as stress and fatigue accumulated. The effect was different for students who preferred to use meaningful versus shallow study strategies. Implications for instruction are discussed.

Managing multiple goals in learning contexts
Caroline Mansfield, Murdoch University, *Australia*

Understanding student motivation in classrooms is pivotal for educators and researchers wishing to enrich the learning potential of students. Recent motivation research has focused on examining motivation in real learning contexts (Volet & Järvelä, 2001) and exploring why students adopt particular motivational goals (Urdan & Mestas, 2006). This paper presents classroom based qualitative research investigating students' motivational goals with a focus on why particular goals are significant for individuals and how goals are managed in real contexts. The primary aim of this study was to investigate the multiple goals pursued by a small group of students over a school year and examine possible relationships between goals. In doing so it was necessary to consider the broader contexts (school, classroom, family, peers) from which goals emanated and how individuals managed goals. The participants were interviewed eight times and observed in the classroom over the period of an academic year. Inductive processes were used to code and analyse data. The initial findings of this study show that students pursue a range of related academic and social goals for a variety of reasons. The significance of multiple goals and multiple contexts is emphasised in these findings as broad goals to please parents or maintain friendships had a direct impact on classroom behaviour, engagement and task goals. Understanding why goals are adopted and how they are managed has significance for researchers who seek to develop motivation theories and educators who wish to assist students reaching their learning potential.

Motivated strategies for learning, approaches to learning, academic achievement and gender: An analysis of pre-service science teachers
Eylem Yildiz, Dokuz Eylul University, *Turkey*
Ercan Akpinar, Dokuz Eylul University, *Turkey*
Nilgun Tatar, Cumhuriyet University, *Turkey*

The purpose of this study is to examine the significant differences between genders in terms of motivated strategies for learning, learning approaches and to explore relationships among pre-service science teachers' motivated strategies for learning, learning approaches and academic achievement. Survey method was employed and purposive sampling method was used in this study. Additionally, some participants will be interviewed by the researchers. The participants of the study are 149 (female=85, male=64) pre-service science teachers, attending "Instructional Technologies and Developing Material Course" at two Universities in Turkey. Motivational orientation and self-regulated learning strategy use were measured by the Turkish version of Motivated Strategies for Learning Questionnaire (MSLQ) (Býyýkßztýrk, Akgýn, Özkahveci & Demirel, 2004). An Approach to Learning Questionnaire (ALQ), developed by Ellez & Sezgin (2002) was used to explore the learning approaches of the pre-service science teachers. There were significant gender differences between female and male students in terms of metacognition and peer learning scales of the MSLQ. Similar to this, there are significant gender differences between female and male the pre-service science teachers' in terms of deep approach and surface approach. Significant positive correlations were found between 3 scales of the MSLQ and deep approach. Besides, significant positive correlations were found between 2 subscales of the MSLQ and surface approaches. Significant negative correlations were found between 4 subscales of the MSLQ and surface approaches. Significant positive correlations were found between 4 subscales of the MSLQ and academic achievement and significant negative correlations were found between 1 subscales of the MSLQ and academic achievement. The analysis of the interview questions have been continuing.

F 11
29 August 2007 17:00 - 18:20
Room: 0.99
Paper Session

Parental involvement in learning

Chair: **Jos Beishuizen,** Vrije Universiteit Amsterdam, *Netherlands*

Academic language use during book reading at home and at school
Lotte Henrichs, University of Amsterdam, *Netherlands*
Rob Schoonen, University of Amsterdam, *Netherlands*
Folkert Kuiken, University of Amsterdam, *Netherlands*

When Dutch children start primary school at the age of 4, they have to deal with a kind of language use that is relatively new to some of them: academic language use. 'Academic language' refers to the language register that is appropriate for cognitively complex communication in educational environments. According to Schleppegrell (2004) this academic register is different from the interactional language register that is commonly used at home. Among the distinguishing

features of the academic register are a higher lexical density, a higher lexical diversity and grammatically more complex sentence constructions. In our longitudinal study in the Netherlands, the development of academic language use in preschool children is investigated. Furthermore, it is the aim of the study to establish the degree to which parents co-construct this kind of language use. It is to be expected that parents who show more features of the academic register in their language input at home, might –implicitly or explicitly- prepare their children for academic language acquisition and therefore enhance school success. In the present paper, a comparison will be made between the language input during book reading by teachers and parents of the same children, focussing on the above-mentioned distinguishing features of the academic register. 22 Dutch children participated in this study. Both the mothers and the teachers of the children performed a book-reading task. The conversations resulting from the book reading were recorded on video and subsequently transcribed. In order to determine linguistic differences between the parental input and teacher-input, lexical and syntactic features of the language input across the two contexts will be compared. Furthermore, various aspects of the complexity of the adult language input will be related to the children's scores on a standardized vocabulary test. Educational implications of our findings will be discussed.

The school–family relation in low socioeconomic environments in Quebec : Impacts of an educational project in nutrition on the attitudes of teachers with regard to parents
Johanne Bedard, University of Sherbrooke, *Canada*
Francois Larose, University of Sherbrooke, *Canada*
Yves Couturier, University of Sherbrooke, *Canada*
Veronique Lisee, University of Sherbrooke, *Canada*

In this communication we present the results of evaluation of the effects of an educational partnership project in nutrition offered in disadvantaged school environments in Montreal on parental implication in class and school, and on the quality of parent-teacher interactions. We compare our results with those obtained with a national sample of teachers on these same objects. A survey by questionnaire conducted with 1260 Quebec teachers provides a full portrait of their attitudes with regard to the parental participation of parents in school life. In a parallel way, data from a second survey by questionnaire and interviews realized with all the teacher participants (N=60) in the project 'Little cooks-networked parents', implemented in eight Montreal schools, allows us to treat the effects of an educational partnership project in nutrition on teacher attitudes concerning parental implication in school environments. The teachers in the national sample note the weak involvement of parents from low socioeconomic environments in the supervision of their children's learning. Their peers who participate in the 'kitchen-nutrition' workshops sponsored by the project notice the direct effects on parental involvement as well as the quality and frequency of their interactions with parents of their pupils and the generalization of these effects at the entire school level. Our results confirm the positive impact of the integration of parents in the supervision of activities pertaining to learning situations, in co-management with teachers, on their attitudes with regard to home-school collaboration. The recognition of parental educational competencies and their relevance in school contexts foster the emergence of a real partnership between parents in disadvantaged environments and school personnel. Our results also demonstrate the power of implementation of home-school-community partnership projects inscribed in a perspective that is ecosystem-based.

Relations between parents' education and students' reading achievement - A cross country comparison

Monica Rosen, Gothenburg University, *Sweden*
Eva Myrberg, Gothenburg University, *Sweden*

Parents' educational level has in most countries been identified as a powerful predictor of students' achievement. The purpose is to investigate the total effect of parents' educational levels, as well as the relative importance of various mediating factors, on students' reading achievement between countries. Data comes from PIRLS 2001 and comparisons were made between Hungary, Bulgaria, France, Italy, Norway, Sweden and Hong Kong. The effects of parents' education on reading achievement were estimated with structural equation modelling. The total effects of parents' education varied considerably between countries and so did the direct and indirect effects. The results imply that the effects of students' home background on achievement are likely to interact with features of school systems. Thereby they can be affected by educational policies and practices. Further comparative research may clarify effects of crucial factors in these aspects. Also, exploring the meaning of various mediating factors across countries can contribute to the understanding of how reading development may be supported in homes and schools.

Perceived family support for learning, achievement goal emphases, and students' achievement goal orientations

Stuart Karabenick, University of Michigan, *USA*
Jeanne Friedel, University of Michigan, *USA*

The present study extends research on achievement motivation and family involvement in student learning. We examined students' perceptions of family support for motivation and academic self-regulation, the relation of such support to students' perceptions of the achievement goals their families emphasize, and the extent to which perceived family support and achievement goal emphases predict students' personal goal orientations. Participants were 750 students in US middle and high schools. Results of factor analysis indicated that students did not differentiate between family support for motivation and support for cognitive or metacognitive strategy use. Perceived support correlated most strongly with perceived family emphasis on mastery goals. Regression analyses indicated that both perceived support and mastery emphasis positively predicted students' personal mastery orientations. In addition, perceived family emphasis on both performance approach and avoid goals positively predicted students' reports of performance approach as well as performance avoid orientations. Thus we found support for a link between perceived family support for motivation and learning strategies, and students' pursuit of mastery goals; however, more research is needed to investigate the family-based antecedents of performance goal pursuit. These findings highlight the critical importance of students' experiences in the family context as they support student motivation for learning.

F 12
29 August 2007 17:00 - 18:20
Room: Konferencia
Paper Session

Teacher education

Chair: **Sylvia Rojas,** National Autonomous University of Mexico, *Mexico*

Rethinking a deliberative context for teacher education from the aims of citizenship education in the new Quebec education program
David Lefrancois, Universite du Quebec a Trois-Rivieres, *Canada*
Marc-Andre Ethier, Universite de Montreal, *Canada*

The Quebec Education Program asks teachers to help students build and question – through a deliberative process – their own comprehension of history, society, and community life instead of insisting on an already established factual content, a dogma. This generates a public debate in Quebec about history teaching and citizenship education. In this condition, many teachers are reluctant to apply such a deliberative model of active learning. After describing this obstacle, we explain how future teachers can proceed to experiment by themselves the effectiveness of those methods, or how they can bring corrections and improvements to unanticipated weaknesses of methods that could be detected in concrete situations. We shall contend that no one can prepare future teachers to help students built their own comprehension without developing critical thinking and integrating this objective into teacher education programs. Indeed, it is not possible to cultivate deliberative and democratic virtues without permitting future teachers to think critically and collectively about different or contradictory interpretations of social, historical and political realities. Consequently, developing critical autonomy is one of the most important aims of teacher education, even though future teachers learn to become much more critical vis-à-vis all sorts of institutional authority and aware of their potential influence on the development of education programs. Some examples of critical deliberation will be derived from different pedagogical activities proposed to future teachers in a new course Education for Citizenship which has been implemented at Universite du Quebec a Trois-Rivieres for more than two years.

Teachers' concepts of experts and children (Reflections on examining interpretations of cognitive development)
Mária Hercz, Kodolányi János University College, *Hungary*

The success of educational reforms and changes are highly dependent on their key figures, the teachers. To improve the education of teachers and to make it more effective it would be essential to explore the teachers' thinking more deeply and thoroughly. The present paper aims at contributing to a deeper understanding of teachers' thinking on the cognitive development of children, is a fundamental domain in education. Cognitive pedagogy provides the theoretical basis for mapping the self-perception of nursery, elementary, secondary and vocational school teachers as experts, as well as their child-concept. We used empirical research methods: the data were collected with questionnaires (reliability is Chronbach-alpha 0,81) containing open tasks that asked for associations and definitions. Approximately 700 educators took part in the research with layered sampling from 73 schools in Fejer County, Hungary. The data induction was processed with SPSS 11.0 statistical software. Hypothesises of the research are the following: Teachers in the practice overwrite their own expert knowledge learnt during their teacher training with the

routines, schemes, habits have learnt in their school they work. Teachers working with different age-groups or in several school-types have typical thinking patterns inside their own teacher-group. Their concepts of experts and children are very different. The positive self-concepts of teachers depend on their success inside their school. The research justified our hypothesis, i.e. there are significant differences in the teachers' thinking and we received new and surprising results as well. The field of pedagogical thinking is the research area where the characteristics of the teacher education system can be observed, because the more the teachers are trained to work with younger students, the more pedagogical and psychological basis they receive, and the higher the importance of the actual teaching practice. The changes in the education system of teachers must begin at this stage.

Student teachers' ideas of writing a scientific thesis within teacher education in Finland
Gunilla Eklund-Myrskog, Faculty of Education, Åbo Akademi University, *Finland*

The teacher education in Finland is university based and leads to a master degree. Science and research are important aspects of the education and students write a scientific thesis (33/40 ECTS). The aim of the research-orientation is that students get a preparedness to systematically and in a reflective way investigate issues and as a consequence develop their own practice as professional teachers. The aim of the research-orientation is thus related to the view of a professional and reflective teacher. However, the research-orientation of the teacher education in Finland has been discussed and criticized. The student teachers conceive the relation between research and the teacher profession as diffuse and difficult to handle and they have difficulties in relating real practical problems to theoretical issues in their work of the thesis. The aim of this study is to investigate student teachers' ideas of writing a scientific thesis within teacher education. Data for the empirical study were collected through essays, including four open questions, with 69 students from the Department of Teacher Education at Abo Akademi University in Finland. The phenomenographic approach was taken as the point of departure and data were analysed in a qualitative way. The results of the study show that in an intellectual way, students understand the motive for and meaning of a scientific thesis in a university based teacher education. They have different conceptions of their own learning in relation to the thesis although the relation to the teacher profession is not at all clear for the students. In order to develop the scientific thesis in teacher education the relation between theory, research, and practice has to be emphasized to a higher extent. A scientific thesis within teacher education should more be treated as a "learning task" for a professional teacher, and not merely as a "research task".

Beginning to argue: argumentation in preservice science teacher education
Sibel Erduran, University of Bristol, *United Kingdom*
Dilek Ardac, Bosphorous University, *Turkey*
Buket Yakmaci-Guzel, Bosphorous University, *Turkey*

The article presents a case for the promotion of argumentation in science in pre-service teacher education. In recent years, argumentation has emerged as a significant goal for teaching and learning of science. As an important aspect of scientific inquiry, argumentation plays a role in the generation and justification of knowledge claims. The theoretical background on the role of argumentation is reviewed and an empirical study is reported on the ways in which teacher training can be supported in the use of argumentation in science classrooms. Case studies of two teachers are used to illustrate how teachers structure lessons and support argumentation in secondary science classrooms after a series of training sessions. Results indicate that the teachers

incorporated those features of pedagogical strategies (e.g. group discussions and presentations) targeted by the training.

F 13
29 August 2007 17:00 - 18:20
Room: 0.100B
Paper Session

Classroom discourse

Chair: **Barbara Moschner,** Universität Oldenburg, *Germany*

School children modeling physical phenomena through programming: a discourse-based analysis of video case studies
Loucas Louca, University of Cyprus, *Cyprus*
Zacharias Zacharia, University of Cyprus, *Cyprus*
Constantinos Constantinou, University of Cyprus, *Cyprus*

This paper analyzes six video case studies from two elementary science clubs during which students used Stagecast Creator to develop models of physical phenomena. The case studies describe in detail the process of developing models of physical phenomena (discourse). Research in model-based learning in science has highlighted a number of distinct stages of student work, and a number of different aspects in each of the two stages. However, it has thus far failed to provide details about the student discourse that teachers need to encourage during scientific modeling. Through the investigation of authentic classroom-based discourse, our purpose is to describe in detail the different aspects of the model development process, seeking to refine our understanding about learning in science through the construction of models as representations of physical phenomena. Using discourse-based analysis, we analyzed a series of whole-class student conversations. Each conversational utterance was separately coded with the aid of the Videograph software with a focus on the micro-content of the conversation in terms of scientific modeling. For this purpose we adopted a descriptive framework of student modeling developed through which we developed codes using open coding. Findings revealed three types of student conversations during scientific modeling: (a) describe the story of the physical system, (b) describe the story of conceptual entities, and (c) investigate relationships between conceptual entities. Findings also suggest two different contexts within the use of computer-based tools for modeling ((i) translation of a physical system's story into code and (ii) evaluation of models) that can trigger productive conversations for scientific modeling. The different conversational modes are neither hierarchical nor sequential. Rather, different modeling contexts seem to "trigger" different types of conversations, and depending on the purpose of their conversation, students engaged in different kinds of discourse. *This study was supported by the Cyprus Research Promotion Foundation.

Student questions and shifts in communication patterns: Tensions or simple attempts at meaning-making owned by youth?
Jrene Rahm, Universite de Montreal, *Canada*

In this paper,I explore classroom interactions among scientists, teachers and students in partnerships intended to make cultural community resources accessible to poor urban youth while

also enriching their learning environment. In particular, the role of students' questions in meaning-making of science are explored, underlining the manner they shift classroom discourse from monologic to dialogic talk while they are also tools that make meaning-making of abstract scientific content possible and visible. To do so, I draw upon qualitative case studies of seven partnership projects (astronomy, astronaut, archeology, entomology, ornithology, paleontology and robotics) among 12 different elementary classrooms (grade 3 – 6). Within each model, scientists animated classroom sessions and visits to museums or research facilities while the students were also engaged in a project related to the topic of the partnership. Through interactive video analysis, exchanges provoked by student questions are explored in terms of the work such questions accomplish. The analysis underlines that student initiated questions transformed much monologic talk driven by scientists' presentation of abstract and complex scientific knowledge into dialogic talk owned by the students. Students' questioning also made readily visible their active engagement in meaning-making and the manner they used their prior everyday and academic ways of knowing as resources in such a process, most often looking for confirmation by the scientists of their meaning-making. In essence, the analysis makes visible the manner knowledge and discourse are continuously negotiated, made and re-made, and hence, in flux. Yet, such hybridity of ways of being and talking are at the heart of effective communities of learners valued by learners.

Orchestration with the Interactive Whiteboard
Karen Littleton, The Open University, *United Kingdom*
Julia Gillen, The Open University, *United Kingdom*
Judith Kleine Staarman, University of Cambridge, *United Kingdom*
Neil Mercer, University of Cambridge, *United Kingdom*
Alison Twiner, The Open University, *United Kingdom*

The Interactive Whiteboard (IWB) is the first ICT tool primarily well-designed for whole-class interaction. It is now in regular use in most British primary schools. Research into its introduction in classrooms has revealed its distinctive potential for enabling the teacher to plan and orchestrate lessons using a wide range of multimodal resources. In this paper we explore ways in which teachers use the IWB in their everyday practice. In doing so we draw upon a conception of teaching as a form of improvisational performance. Our UK Economic and Social Research Council (ESRC) funded project has focussed on use of the IWB within four classes of children aged 7-11 years, at the upper end of primary education. Each class was video recorded during two sequences of two lessons, providing 16 lessons overall. Teachers were also interviewed to discover how they account for their use of IWBs within their teaching and learning. Our analyses illuminate the ways in which teachers orchestrate a rich blend of multimodal resources to engage students' cognitive and imaginative capacities. We show how teachers use combinations of 'matched resources' to support the bridging of pupils' understanding from the known to the new, and from everyday to academic understandings. We focus on the distinctive contributions that the IWB can make to teaching and learning, including resourcing the development of ideas and themes over time, while enabling spontaneous responsiveness to situations as they arise. We show how, through imaginative deployment of the semiotic resources made available through use of the IWB, teachers vary the tempo of lessons and moderate mood and tone, to sustain pupil engagement in creative acts of transformation.

Promoting intercultural learning in English as a foreign Language: The interplay of teachers' and students' experience in class
Kerstin Gobel, University of Wuppertal, *Germany*
Andreas Helmke, Landau University, *Germany*
Tuyet Helmke, Landau University, *Germany*
Friedrich W. Schrader, Landau University, *Germany*
Wolfgang Wagner, Landau University, *Germany*

Due its central position within language teaching the complex task of developing intercultural competence is an important aim for the English as a foreign language class. Nevertheless the conceptions about implementation are quite diverse and lack empirical foundation. The general aim of this paper is to answer the question, which prerequisites of teachers and students and which kinds of observable aspects of instruction lead to a promotion of intercultural learning in the ESL class. In order to answer these questions, different paper-pencil instruments and video data are used in connection with the DESI-Study (German-English-Proficiency-Study-International). 100 English classes in the 9th grade of all the 3 major types of German high school are videotaped and questionnaires are administered to teachers and students. The results indicate that the discussion of student's experiences and ideas in class can foster their intercultural interest and awareness. Classes where students have more opportunities for participation and expression of their ideas and experiences score higher in intercultural interest and awareness. The interaction realised in the classroom are connected to the intercultural experience of teachers. The results provide evidence for the importance of (1) quality and quantity of intercultural contact of teachers, (2) their intercultural sensitivity and (3) their competence to enhance intercultural competence of their students. Teachers with more intercultural experience and sensitivity introduce a higher amount of intercultural topics in their language class as rated by themselves and their students. Furthermore, these teachers give more opportunities to their students to express ideas and experiences concerning intercultural encounters during the course of the lesson than those with less intercultural contact and intercultural sensitivity.

F 14
29 August 2007 17:00 - 18:20
Room: 0.79 Jánossy
Paper Session

Social interaction in learning and instruction

Chair: **Beatrice Ligorio,** University of Bari, *Italy*

Making Minds: A framework for analysing metacognition through classroom talk and interaction
Carol McGuinness, Queen's University Belfast, *United Kingdom*
Carol Curry, Queen's University Belfast, *United Kingdom*

The paper draws on the findings of the ACTS (Activating Children's Thinking Skills) project in Northern Ireland. It reports the development of a framework for analysing metacognitive features of teacher-pupil dialogue in classroom interactions. The theoretical perspective with regard to children's learning focused on the development of their metacognitive capacities - on their ability to become proactive about their learning in terms of planning, monitoring and appraising their

thinking. Video recordings of thinking lessons were conducted with a sample of 21 teachers who were teaching 8-9 year old children. Analyses of the videos showed that the ACTS teachers arranged their classrooms in ways that supported opportunities for children's talk and created conditions for mediating metacognition. They engaged children in cognitively demanding tasks and made thinking more evident in classrooms by developing a vocabulary for talking about thinking and by modelling thinking in more concrete situations. What made good thinking lessons distinctive was that learners were given opportunities to talk about thinking, to jointly construct meaning, to evaluate their thinking and to make connections to contexts both within and outside the curriculum. The evidence from the video recordings was corroborated by teachers' reports about changes in their classroom practices. A larger sample of ninety-four teachers who participated in the ACTS professional development programme completed questionnaires. They reported substantial changes with regard to both the quantity and quality of group work, increases in children's talking and listening, in the quality of questioning and, overall, more pupil involvement and independence. They also reported significant changes in their images of themselves as teachers – an increased awareness of the importance and value of teaching thinking, being more open to alternative approaches and allowing children to be more independent in their learning.

An exploration of instructional discourse in PBL learning environments: Nuances of monologism and dialogism uncovered

Stefanie Chye, Republic Polytechnic, *Singapore*
Richard Walker, University of Sydney, *Australia*

Recent years have witnessed the ready embrace and recognition of Problem-Based Learning (PBL) as a valuable pedagogical method. While its underlying benefits are clear, what is equally apparent is that not all PBL learning environments are effectual. This attests to a need for insights into how the learning affordances inherent in PBL can be maximized. A key factor determining the efficacy of PBL is the instructional discourse employed during facilitation. Yet, instructional discourse in PBL is with few exceptions, typically neglected as a resource of student learning. The objectives of the present study are two-fold. Firstly, it seeks to explore the types of instructional discourse that are employed during PBL facilitation, and secondly, to identify the relationship between the instructional discourse employed and students' learning processes. The overarching theoretical framework is informed by what may be broadly termed a sociocultural perspective. Although sociocultural theory provides a firm basis for examining the general role of instructional discourse in education, it does not specify the types of discourse that may occur. As such, the Bakhtinian-derived constructs of monologism and dialogism are used as theoretical heuristics to describe the types of classroom instructional discourse. The study is situated within a tertiary institution that employs PBL as the sole instructional methodology. The classrooms of eight facilitators and their students were video-recorded and the interactions transcribed. Transcripts were analysed for monologic and dialogic episodes and how these support or constrain student learning processes in PBL. Preliminary results indicate that dialogism is a layered and hybrid construct with varying degrees of divergence and characteristics. Dialogism may also vary depending on the context of use with different implications for students' learning processes. Overall, the study suggests that current research on instructional discourse may need to fine-tune the constructs of monologism and dialogism to avoid oversimplifying pedagogical dialogue.

The importance of teacher interpersonal behaviour for students' subject-related attitudes in science in Turkey
Sibel Telli, Middle East Technical University, *Turkey*
Perry den Brok, Utrecht University, *Netherlands*
Jale Cakiroglu, Middle East Technical University, *Turkey*

The purpose of this study was to examine associations between Turkish high school students' perceptions of their science teachers' interpersonal behaviour and their attitudes towards science. The study is first to use a culturally adapted version of the Questionnaire on Teacher Interaction (QTI) in Turkey with a large sample of secondary science classes. The QTI maps teacher-student interpersonal behaviour by means of two relational dimensions, Influence (the degree of teacher control of communication) and Proximity (the degree of teacher cooperation with students). Data on students' subject-related attitudes were collected with the Test of Science Related Attitudes (TOSRA). A total of 7484 students (grades 9 to 11) from 278 science classes (55 public schools) in thirteen major Turkish cities participated. To answer the research questions, multilevel analyses of variance were conducted with MLN for Windows on the TOSRA scale (inquiry, enjoyment, leisure interest and career interest) scores. In the analyses, three levels were distinguished: student (individual level), class and teacher. It was founded that mother education level, gender and number of books at home were related with scientific attitudes. As for the dimensions of the QTI, Influence (DS) was connected with only Enjoyment, while Proximity (CO) had a connection with both the Inquiry and Enjoyment scales. School type also emerged as significant variable: students in Anatolian schools reported less Leisure interest in science than students from regular high schools.

Exploring the influence of individual characteristics on interactions during collaborative gaming
Philip Bonanno, University of Malta, *Malta*

Developments in gaming technology are turning games into an intensely interactive social experience. To integrate games in learning a paradigm shift in pedagogy is indispensable, moving from content-oriented didactical models to ones that are process-oriented. An interactions-oriented model is thus proposed that organizes task and person-oriented interactions along three dimensions and across three pedagogical levels. The influence of gamers' personal characteristics on Task and Person-oriented interactions are investigated with a sample of college students. Personal characteristics include the extro/introvert personality dimension, gender-related neurocognitive and affective propensities and gaming competence. Two types of data were collected. Surveys were used to collect data about gaming tendencies of college students. Analysis of video recorded collaborative gaming sessions quantified the identified categories and directionality of interactions. Different genres of games were used to create different gaming contexts. Appropriate statistical tools were used to investigate possible interactions between the identified individual characteristics and the dependent variables – type and directionality of interactions. The results are used to develop interactions profiles for single or groups of gamers. The implications of such profiling system and the influence of individual factors in collaborative gaming are discussed within the context of a proposed pedagogical model, in relation to game design, adaptivity and collaborative game-based learning.

F 15
29 August 2007 17:00 - 18:20
Room: 2.54 Novobátzky
Paper Session

Student learning in higher education

Chair: **Marina Serra Lemos,** Universidade do Porto, *Portugal*

Student teachers' search strategies and self-efficacy in electronic environments
Helene Fournier, Universite du Quebec de Trois-Rivieres, *Canada*
Jean Loiselle, Universite du Quebec a Trois-Rivieres, *Canada*
Nadia Rousseau, Universite du Quebec a Trois-Rivieres, *Canada*

This study describes the information seeking strategies used by student teachers in electronic environments and examines self-efficacy related to the use of these strategies. Study is embedded in a theoretical framework that draws on previous studies of self-efficacy model (Bandura, 2003), information search process (Kuhlthau, 1991) and information seeking strategies in open-ended information systems such as Internet (Hill, 1999). Two questionnaires were administered to 137 student teachers of a Canadian university (Universitéê du Quéêbec à Trois-Riviðres) : The Research Process Survey (RPS) (Kracker, 2002) measuring awareness of cognitive and affective strategies and satisfaction with the search process, and part of the Online Technologies Self-Efficacy scale (OTSES) de Miltiadou et Chong Ho (2000), assessing Internet Competencies.. Ten student teachers from elementary, secondary and special education programs were selected and performed nine experimental tasks. Participants were encouraged to verbalise what came to their mind as they search information in electronic environments. Finally, interviews were also carried out with the same ten participants. The study highlighted a variety of strategies used by student teachers as they sought information in electronic environments. Participants feel that they are competent to use most of the functions available in electronic environments that are directly linked to information search. However, certain shortfalls have been highlighted in the strategies used to choose proper descriptors, to limit the research results, and to evaluate or store information. Most of them feel competent to teach the search process to their future students. Moreover, the study shows that student teachers have positive perception of their self-efficacy regarding search strategies in electronic environments.

Translation of university teachers' understandings of generic attributes: Creation of learning experience for students
Patrick Lai, The Hong Kong Polytechnic University, *Hong Kong*
Margaret Taplin, The Hong Kong Polytechnic University, *Hong Kong*
Alex Tu, The Hong Kong Polytechnic University, *Hong Kong*
Kylie Chung, The Hong Kong Polytechnic University, *Hong Kong*

Developing students' generic competencies in the professional context is considered as one of the pivotal responsibilities of universities, which are held accountable for the kind of education they provide for their students. In the past, without a clear definition of the attributes, it would be extremely difficult for faculty members within universities to come up with a consensus on centralized support in this area. Using the phenomenographic approach, Barrie's study identified a hierarchy of four empirically derived and increasingly complex categories of university teachers' understanding of generic attributes. Based on these understandings, this study attempted to revise

the University's mission statement on development of students' generic attributes. The significance and originality of this paper is that it has extended Barrie's study by exploring ways of translating these conceptions into the production of educational tools to enrich students' learning experience to prepare them for developing the attributes that are important in the professional context. Two rounds of semi-structured interviews, which involved 57 university teachers and 27 final year students from 14 departments of the University. The first round of interviews was to identify the key generic competencies and their associated conceptions. Interviewees of the second round of interviews were asked to construct a case or problem around the identified key competency by suggesting workplace scenarios in which graduates would be likely to need the competency and the consequences of their not being able to demonstrate it. Twelve generic competencies were identified: critical / analytical thinking, time management and organizational / self learning skills, communication / presentation skills, work ethics and social responsibility, interpersonal skills, global outlook, problem solving, biliteracy and trilingualism, creative thinking and leadership. Case examples are given to illustrate how these generic competencies align with the "translation" and the "enabling" conceptions and how the educational tools have been produced.

A metacognitive profile of doctoral students
Jill Scevak, University of Newcastle, *Australia*
Robert Cantwell, University of Newcastle, *Australia*
Sid Bourke, University of Newcastle, *Australia*
Anna Reid, Macquarie University, *Australia*

The purpose of the study was to identify the metacognitive attributes of a cohort of doctoral students from two universities as measured by a series of self-report instruments. Consistent with expectations, the cohort presented a positive metacognitive profile, with critical measures of coping, efficacy, volition and knowledge at the higher end of the scales, and measures of procrastinatory behaviours at the lower end of the scales. However, further analysis revealed within cohort differences within this profile, with cluster analytic techniques identifying three metacognitive groupings – one that was potentially non-problematic, a second that was potentially anxious and dependent, and a third that was associated with potentially weaker and at-risk candidates. The implications of these data for supervisory pedagogy are raised.

Relationships between student identity, perceptions of the learning community, approaches to learning and performance
Ana-Maria Bliuc, University of Sydney, *Australia*
Robert A. Ellis, University of Sydney, *Australia*
Peter Goodyear, University of Sydney, *Australia*

Integrating ideas from student approaches to learning (SAL, Marton & Säljß, 1976a, 1976b; Entwistle and Ramsden, 1983; Marton and Booth, 1997; Prosser and Trigwell, 1999; Biggs, 2003) and social identity theories (SIT, Tajfel & Turner, 1984) this study focuses on the relationship between students' approaches to learning, their performance, and social and psychological aspects of learning. Specifically, students' identity and perceptions of learning community (as captured by the Learning community scale, McInnis, 2001) and their role in relation to students' approaches to learning were explored. Linear regression analysis revealed that a strong student identity was associated to a deep approach to learning which in turn is linked to higher marks. Also higher scores on the Learning community scale are related to a deep approach to learning. Significantly, a surface approach is not associated to students' identity and their perceptions of the learning

community, but it is negatively related to the overall performance. Our study argues for the value of an integration of phenomenographical and social identity frameworks when an emphasis on social and psychological aspects of the learning experience is sought.

F 16
29 August 2007 17:00 - 18:20
Room: 7.59
Paper Session

Teacher professional development

Chair: **Robert Jan Simons,** University of Utrecht, *Netherlands*

University teachers' self-concept as a teacher
Anne Nevgi, University of Helsinki, *Finland*
Sari Lindblom-Ylänne, University of Helsinki, *Finland*

The aim of the study is to explore how university teachers perceive themselves as teachers. The self-concept as a teacher is part of a professional and academic self-concept and interrelated with academic competence beliefs. University teachers' conceptions of teaching has been studied during the last decade expansively, but the academics' self-concepts as a teacher has not yet explored. Participants of the study were 68 university teachers representing diverse disciplines. Teachers were interviewed using semi-structured questionnaire. The interviews lasted 26-80 minutes, and were transcribed and content analyzed. The results showed that teachers' self-concept as a teacher was diverse and complex in nature. The 35 different self-concept categories could be distinguished. The categories were classified in three different dimensions. The first dimension of self-concept was labelled as Unclear versus clear teacher self-concept. In this dimension, the categories of teachers' self-concepts varied from difficulties to describe self as a teacher to clear and explicit descriptions as a teacher. The second dimension of self-concepts was entitled as Keeping distance versus coming near students. The categories of self-concept as a teacher varied from teachers' descriptions being as a strict, demanding and feared by students to descriptions of teachers as interested in their students' learning and liking to communicate and interact with student. Third dimension was entitled as Rigid versus flexible as a teacher. The categories of teachers' self-concepts in this dimension varied from self-concept as carefully planning and organizing teacher to flexible and improvising teacher who is actively involved in interaction with students. The results of the study help us to understand how university teachers perceive them as teachers and how this effects to their teaching. The results can be applied in university teachers' pedagogical training courses in order to help teachers to develop their identity as a teacher.

Engagement in teaching
Arne Skodvin, University of Oslo, *Norway*

The aim of this project is to investigate the notion of "engagement in teaching" empirically, The idea has been originated in working with staff and curriculum development among university teachers. Research on optimal teaching strategies often show less commonality across subject fields than one might anticipate. An alternative approach may be to use concepts that can be talked about generally, and yet at the same time can be specified within a given subject area.

"Engagement in teaching" may be one contribution in this respect. The paper will present and discuss some preliminary findings from exploratory in-depth interviews with professors and lecturers from different faculties at the University of Oslo, who were selected on the criterion that they had been reported to elicit engagement in their students. Transcripts of interviews were submitted to qualitative analysis. 433 quotations were first marked with 255 different key words, and then condensed into 18 keywords representing 232 quotations, which could be distributed into four broad categories. The analysis showed that for all the teachers, engagement was related to all four factors: the teachers personality, the subject matter, the mediation of subject matter, and the teachers' relation to others. The relative importance of each factor, however, could vary from one teacher to another. The study indicates that engagement in teaching involves more than lucid imparting of content matter, and that it can probably be achieved in a variety of ways. An important implication may be to develop awareness of this variation among university teachers.

What is the use of cooperation with science for teachers? On the relevance of cooperation between school and university in an implementation research project
Petra Herzmann, Saarland University, *Germany*
Andrea Sparka, Saarland University, *Germany*

Studies on implementation research stress the relevance of cooperation between science and practice as a network of people with different expertise (Gräsel & Parchmann, 2004). Collaboration between school and university is expected to support a reflexive and critical view of the participants' own practice. Also, integration of different forms of knowledge might be encouraged by interaction with educational science institutes (Erickson, Minnes Brandes, Mitchell & Mitchell, 2005). In our project on the promotion of reading literacy (Herzmann, Sparka, & Gräsel, in press), we have conceptualized a further training for teachers that is supposed to be an offer for cooperation with university. Based on the evaluation of six training sessions by means of a questionnaire (n=120) and interviews with the involved teachers (n=22), we analyse how teachers describe their own role in the research project and how they describe the cooperation with university. The ambivalent anticipations had different origins. Our aim was to reconstruct three forms of types that allow us to explore how transfer between theory and practice takes place: the "receptive type", the "pretended expert type" and the "reflexive type". Furthermore, we tested reading literacy of secondary school students (n=663) and thus evaluated, if teachers who belong to the "reflexive type" support the students' reading achievement in a particular way. Performance analyses showed that teacher type and willingness to cooperate as well as concrete interventions in the classroom predicted reading achievements.

Teachers' understanding of learning and teaching practice
Manuel Pintor, Autonomous University of Madrid, *Spain*
Carmen Vizcarro, Autonomous University of Madrid, *Spain*

In this paper a research is reported in which we tried to grasp teachers' understanding of the nature of knowledge and how learning takes place. With this end, semistructured interviews were conducted with teachers in which they were asked how they viewed their own learning as well as that of their students. The interviews included questions about core educational concepts such as the nature of knowledge and its acquisition (learning), transfer, motivation and the tasks which help learning to occur (teaching). We were interested in finding out what teachers' theories are, in which way they relate to classical theories of learning and what is their relationship to teaching practice. Fifty four teachers (male and female, secondary and university, working in different disciplines) were interviewed and the content was analyzed following a process based on grounded

theory (Strauss & Corbin, 1990).Then, these understandings were subject to different statistical tests to describe how they clustered and differed in consistent ways. The results show three different clusters that were labelled empiricist/behavioural, cognitive and multiperspectivist, representing 24, 46 and 30% of the sample. Then, the relationship of these personal theories were related to teachers' practice, as reported by teachers themselves. Teachers' way of understanding knowledge and learning were, as expected, related to different teaching practices. Being aware of teachers' theories and understandings of these core educational concepts and their relationship to teaching practice is important in order to start educational development activities addressed to teachers on a firm basis, so that these activities are based on their epistemological beliefs and construct on their perceptions. The limitations and implications of these findings are discussed.

F 17
29 August 2007 17:00 - 18:20
Room: 0.81 Ortvay
Paper Session

Language acquisition

Chair: **Erica de Vries,** Universite Pierre-Mendes-France, *France*

Capitalizing on multilingualism: Results of a large scale assessment study on language learning in Germany
Hermann-Günter Hesse, German Institute for Int'l Educational Research, *Germany*
Dominique Dahl, German Institute for Int'l Educational Research, *Germany*

The study is part of the DESI survey (International Study of Students' Achievements in German and English). Data of about 10.000 representatively sampled students' German and English language achievement test results have been collected in order to compare monolingual students with German as the first language (G), monolingual students with another language than German as the first one (nonG) and multilingual students with German and another language as first languages (G+nonG), to evaluate the effects of the composition of the class and to test the hypothesis of the promotion of foreign language learning by multilingualism. Major Findings: G+nonG and nonG are equal or better in English than G if social background, basic cognitive ability and gender are controlled for. Multilingualism influences achievement in German language positively. The composition effects according to the proportional presence of nonG and G+nonG students on German language learning results disappear if in a two-level hierarchical model school form and socio-economic background are controlled for. The same composition effects with the same control variables turn to positive ones on English learning being more salient for high percentage of multilingual students in the classroom. Conclusion: Students who acquired a first language other than the dominant one dispose of a high capacity for foreign language learning. This supports the inter-language hypothesis. German lessons apparently do not make enough use of this capacity. The presence of nonG and G+nonG students helps to increase the learning results in English if social background variables are controlled for.

Possessing the ability to use possessives when learning English as second language
Mona Holmqvist, Kristianstad University, *Sweden*
Jane Mattisson, Kristianstad University, *Sweden*
Gunilla Lindgren, Kristianstad University, *Sweden*

The present study focuses on three different groups of pupils in year five in the Swedish school system (eleven to twelve year olds). It investigates how the selected pupils learn how to use possessive pronouns. The method employed is the so-called 'learning study cycle' (Holmqvist & Nilsson, 2005; Holmqvist, Gustavsson & Wernberg, in press). Variation theory forms the theoretical framework for the study (Marton & Booth, 1997; Holmqvist, 2004). The present paper describes how a group of teachers and researchers plan, give and revise three lessons for different groups of pupils. The goal was to demonstrate how the way in which one presents different critical aspects of a given topic can influence the learning process. The results demonstrate that pupils who were presented with dependent possessive pronouns alone demonstrated the best results directly after the lesson. The two groups of pupils who were given the opportunity to distinguish between dependent and independent possessive pronouns were forced to identify minor qualitative differences between the topic presented and an additional, but closely related, topic. This method has been shown to have a positive effect on pupils' learning in the long term. This phenomenon is referred to as 'generative learning' (Holmqvist, Gustavsson & Wernberg, submitted).

Word reading builds on oral language? The role of vocabulary knowledge and phonological skills in Italian deaf children's word and pseudo-word reading
Barbara Arfe, University of Verona, *Italy*
Umberta Bortolini, ISTC-CNR of Padova, *Italy*
Francesca Poeta, University of Padova, *Italy*

This study investigated how vocabulary knowledge and phonological skills are related to Italian deaf children's word and pseudo-words reading. Twenty-one severely to profoundly deaf children (mean age: 9.6) and 21 hearing controls, matched for grade level (mean age 9;4), participated. The participants were administered a standardised test of words and pseudo-words reading, a test of vocabulary knowledge, the PPVT-R, and two tests of phonological awareness. Results revealed that phonological skills effectively play a major role in deaf children's word and pseudo-words reading, even greater than in their hearing controls.

F 18
29 August 2007 17:00 - 18:20
Room: 1.71 Pócza
Paper Session

Writing

Chair: **David Galbraith,** Staffordshire University, *United Kingdom*

The effect of quality of implementation of science inquiry approaches in elementary classroom - year 2 of a three-year study
Brian Hand, University of Iowa, *USA*
Lori Norton-Meier, Iowa State University, *USA*
Recai Akkus, Iowa State University, *USA*
Murat Gunel, Ataturk University, *Turkey*
Larry D. Yore, University of Victoria, *Canada*

This project is reporting on the first 2 years of a three-year study of encouraging teachers to use the Science Writing Heuristic (SWH) approach to teaching science inquiry within elementary classrooms. The SWH approach is based on providing a scaffold for students that helps them build scientific arguments as a critical component of inquiry. The study focuses on following 32 teachers for three years as they are involved in regular professional development activities and implement the SWH strategies within their classrooms. The research design involves gathering data on the quality of implementation, collecting student data involving work on science units and examining student data on standardized test scores. The results show that the level of implementation does have an impact on student performance on standardized test scores. The gap in student scores between low and high implementation of the SWH approach grew in year 2, with particular impact occurring with socio-economic status students.

An investigation of the relationship between writing processes and text quality in L1 writing
Daphne van Weijen, Utrecht University, *Netherlands*
Huub van den Bergh, Utrecht University, *Netherlands*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Ted Sanders, Utrecht University, *Netherlands*

This project focuses on the relationship between the writing process and text quality. A writer carries out several different cognitive activities during the writing process, such as reading the assignment, planning, formulating and revising. Research has shown that each of these activities has a different relationship with text quality and that none of these relationships are stable during the writing process. However most studies to date consisted of one writing task per subject. So it is assumed that the relationship between writing processes and text quality does not change over writing assignments. That is strange, because research has shown that there can be large differences in text quality between texts written by the same writer. In order to determine a writer's writing skill, we need to examine several texts he has written and these texts must be judged by several judges. Therefore in this study 20 subjects wrote 4 texts each in their L1 (Dutch) under think-aloud conditions. This enabled us to examine the extent to which variations in text quality within writers can be explained by variations in the way they execute the writing process. Preliminary results indicate that process characteristics vary greatly between tasks. For example, a writer who generates a lot for one task does not necessarily do so for another. This holds for most

of the cognitive activities investigated. In addition, text quality varies both within and between writers. The relation between text quality and writing processes varies between assignments as well, although the correlation between processes and text quality does not vary to the same extent. For instance, reading the assignment is only positively related to text quality at the start of the writing process. But the magnitude of the correlation varies between assignments.

Learning writing by reviewing
Kwangsu Cho, University of Missouri, *USA*
Christian Schunn, University of Pittsburgh, *USA*

We examine a theoretical perspective on reciprocal peer reviewing of writing that could be a more common form of peer collaboration for writing. The traditional approach, called Learning Writing by Writing, focuses on opportunities for practicing writing with feedback. The alternative approach, called Learning Writing by Reviewing, considers reviewing as an important method for learning writing skills, because reviewing is a problem solving activity that engages problem detection, diagnosis, and solution generation. We empirically evaluated the Learning Writing by Reviewing hypothesis with 87 students in three physics courses that were using SWoRD (Cho & Schunn, 2003, 2005, 2007), a reciprocal peer review system. In support of the hypothesis, the reviewers' own writing skills improved according to the helpfulness of their review comment-giving work.

Improving text coherence: effects of collaborative revision conditions on writing quality in EFL
Elke Van Steendam, Universiteit Antwerpen, *Belgium*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Lies Sercu, University of Leuven, *Belgium*

Exercises in which students have to analyse and revise other people's writings are often used in writing education and incorporated in writing syllabus design. Few experimental studies, however, have been published showing that revising other people's texts has a beneficial effect on revising and writing one's own texts. This transfer effect is explored in more detail in this paper by analysing writing assignments from 350 first-year Bachelor students of Applied Economics at a Belgian university. These EFL learners have been assigned to five different learning conditions which vary as to the degree of instruction and guidance in collaborative (dyadic) revision. In four of the five conditions, dyads have to revise text fragments for coherence and structure (collaborative revision). In one experimental condition, the so-called comparison group, students revise the fragments individually (individual revision) without any instruction. None of the revisers have written the text fragments themselves. In this paper we investigate which of the five experimental conditions is more effective to teach novice revisers how to write a well-structured and convincing letter of application. Multilevel analyses show statistically significant differences between the various conditions suggesting that some instructional strategies are more successful than others to guarantee transfer from revising other people's texts to writing and revising one's own texts. Analyses also suggest that certain forms of guided collaborative revision instruction are more effective for specific student characteristics such as level of reading and writing and revision skills. Rijlaarsdam, G., Couzijn, M., & Van den Bergh, H. (2004). The Study of Revision. In Allal, L, Chanquoy, L., & Largy, P. (Vol. Eds), Studies in Writing: Vol. 13, Revision. Cognitive and Instructional Processes. (p. 189-207). Dordrecht: Kluwer Academic Publishers.

F 19
29 August 2007 17:00 - 18:20
Room: Harmónia
Paper Session

Learning environments

Chair: **Zvia Fund,** Bar-Ilan University, *Israel*

Cognitive conflicts in learning with multimedia 1)
Elisabeth Sander, University of Koblenz-Landau, *Germany*
Andrea Heiss, University of Koblenz-Landau, *Germany*

Contemporary approaches in instructional research consider learning as an active and constructive process. Many constructivist ideas can be traced back to Piaget's genetic structuralism. In Piaget's equilibration model the cognitive conflict plays an important part. A cognitive conflict arises if a problem cannot be solved due to unsuccessful attempts of assimilations. In a learning process progress is primarily achieved when in consequence of a cognitive conflict inadequate cognitive structures are replaced by others which are more suitable in a real situation. With multimedia learning the question arises whether the method of "conflict induction" can also be successfully adapted to pupil-computer-interaction. Therefore a learner-controlled conflict inducing version of a learning program on trigonometry was developed. A program-controlled, no conflict inducing learning program for trigonometry, was used as a version for comparison. Results indicate that pupils learning with the learner-controlled version of the program showed more cognitive conflicts than pupils learning with the program-controlled version. Concerning learning performance the effect was moderated by prior knowledge: Pupils with high prior knowledge and learning with the learner-controlled version obtained better results in a test of deeper comprehension. Furthermore almost all pupils showed a greater acceptance for the learner-controlled version. Summarising the results indicate that multimedia learning environments should carefully induce cognitive conflicts when learning prerequisites are taken into account. 1) The project was supported by the German Research Foundation (Az: SA 296/14-1)

Domain specific action competencies in natural science – a video study
Leo Gürtler, University of Education Weingarten, *Germany*
Anne A. Huber, University of Education Weingarten, *Germany*
Dagmar Wolf, University of Education Weingarten, *Germany*

The topic competence plays an important role in current educational research. Especially social, personal, and methodological competencies are important besides cognition. Along a one year intervention study, results of a video study on action competencies of students (7th class level, German Realschule) facing scientific problems (see below) will be presented. This takes place within the natural sciences (NWA, a conjoint school subject of chemistry, biology, and physics). As problem tasks we use the „experimental tests" of TIMSS. The video study is used to validate and triangulate the effects of the intervention program on the level of problem solving, autonomy, and communicative skills of students, and accordingly students and teachers. The role of teachers is such that from the Vygotskian perspective, competence is defined as the difference between performance without support and performance with support (from peers, teachers) to cover the zone of proximal development. From a theoretical point of view, in line with self-determination theory, rating scales (rooted in SDT) are used to enhance the perspective of the video data on the

level of classes. A theoretical model of competence is constructed which differentiates qualification (knowledge) from competence (action based on knowledge and wisdom). To understand competencies besides mere performance, it is necessary to reconstruct the subjective theories of students, too. The whole study is divided into three parts: 1 – change of subjective theories of teachers, 2 – changes on the level of students, and 3 – changes on the level of the schools itself. In the presented study, we will focus solely on part 2. The video data will be analyzed to construct a taxonomy of competence which is domain specific. Results from the video data will be presented and discussed.

Supporting chat and discovery learning
Nadira Saab, University of Amsterdam, *Netherlands*

The main aim of this paper is to focus on the interaction between the processes of discovery learning and collaborative learning. Collaborative learning can contribute to better learning in problem solving situations, as well as in discovery learning environments. Several studies have shown that collaboration without instruction or support on how to collaborate does not lead automatically to effective knowledge construction. In this paper, the collaborative learning process as well as the processes of discovery is supported by instructing learners in effective communication skills and also by means of providing a cognitive tool aimed at assisting hypothesis generation and guiding learners through the discovery process. In this paper, three studies are presented in which these research questions were addressed. In these studies, secondary school students (age 15-17) worked with a collaborative simulation-based learning environment called "Collisions" (Physics). Students worked collaboratively in dyads on two different computers, using a shared screen and a chat channel to communicate. The learners saw the same windows on their computer screen and could discover the environment together. They could switch the control over the cursor by clicking the mouse. Two kinds of support were provided: communication-oriented instruction in the form of the RIDE rules, and a cognitive tool, the CHT. The RIDE rules turned out to promote effective communicative and discovery activities. This finding is in line with other studies in which students benefited from instruction in effective communication, but in which communication took place face-to-face, rather than through chat. The CHT was not used very often, but when it was used, it was positively related to the use of effective activities. As found in previous research, there is a need for training in practical and social skills. This paper provides more insight into how students' learning processes can be supported.

Help design in a computer-based learning environment: teaching argumentation skills through the use of examples
Silke Schworm, University of Regensburg, *Germany*

Learning with self-explaining examples is an effective method in well-structured domains. We analyzed this method in teaching the complex skill of argumentation. In an experiment we compared three conditions (n = 47 students of educational sciences) that differed with respect to whether and how the processing of the examples was supported by different help functions. The analysis of the video-based examples was either supported by additional examples displaying the equivalent argumentational structure or by Conceptmaps visualizing the argumentational structure. The control group received no help. We found that examples of argumentation could be successfully employed in order to teach skills of argumentation. Covariance Analysis revealed no main effect of help design on learning outcome. However there was a significant effect of learners' help seeking activities. Learners who used the help facilities more often showed significant higher learning outcomes. Principal based help facilities (concept maps) thereby were most accepted by the learners.

F 20
29 August 2007 17:00 - 18:20
Room: 0.100C
Paper Session

Teacher education

Chair: **Denise M. Whitelock,** Open University, *United Kingdom*

The Mindful Teacher. How differences can be a resource for learning.
Emily Eijkelenboom-Teunissen, Maastricht University, *Netherlands*
Piet Van den Bossche, Maastricht University, *Netherlands*
Wim Gijselaers, Maastricht University, *Netherlands*

In most studies on collaborative learning, student groups are more or less assumed to be homogeneous in their cultural and educational background. Diversity (cultural, expertise, gender, etc.) is seldom considered as a factor of explicit research interest. However, with the ongoing internationalization in education and the resulting increase of diversity in the student population there is an urge for attention to diversity (management) in learning settings. A major challenge is to manage the potentials and dangers of diversity in groups in order to make differences a resource for learning. In this study the influence of student diversity on group learning is investigated. Furthermore the role mindfulness of the teacher is researched. A mindful teacher is described as taking care for individual group members, and stimulating the group to respect and assess each others unique differences and contributions. Mindfulness of the teacher is considered to be important for the enhancement of group learning behaviors and performance. The results show the influence of informational diversity on group learning. Nationality diversity shows no significant effect on learning. The results of this research indicate the importance of mindful management by the teacher for group learning. Group learning behaviors fully mediate the influence of informational diversity and teacher's mindfulness on performance. There is no interaction effect between diversity and tutor mindfulness, which implies that mindful teacher behavior is not moderating the influence of these types of diversity on learning in specific. In the discussion the need to uncover and focus on the important underlying processes of diversity in groups is made explicit. The results show the stimulating role of teacher's mindfulness to foster such an important process as group learning. The care for individual group members, and stimulation to respect and assess each others individual differences and contributions, enhances learning.

Integrating play and playfulness into curriculum-based education: the Tutoring-Playing-Learning (TPL) model
Pirkko Hyvonen, University of Lapland, *Finland*
Heli Ruokamo, University of Lapland, *Finland*

The aim of this study was to develop a pedagogical model that provides a theoretical framework for playing and learning as well as definitions of playfulness. The model offers tools for educators through the integration of playing and games into curriculum-based formal education and the introduction of playful learning environments (PLE). A PLE is an outdoor playground environment situated in a schoolyard that facilitates playing, games and other physical activities. These opportunities are further enhanced through information and communication technologies (ICTs) embedded in the environment. The pilot PLEs described in the study are located in Finland; future PLEs will be located both in Finland and abroad. The focal research question in the study -

How can play and learning be integrated into curriculum-based education? -was investigated using two sets of empirical data comprising children's (N=49) and teachers' (N=14) views on play and learning environments. The data were collected through creation sessions and interviews and coded and analysed using the grounded theory approach. Teachers value playful learning processes that ensure that the goals of curriculum will be met. Children prefer emotional play worlds that allow them to experience excitement and amusement and afford opportunities for collaborative activities. The concept of playfulness encompasses eight features of activities and the environment: embodiment, emotion, collaboration, culture, action, narration, creation and insight. The pedagogical model Tutoring-Playing-Learning represents the interactional processes among these elements. Tutoring encompasses the teacher's actions, peer collaboration and environmental factors that support children. Playing is defined as child-centred actions that facilitate learning. Learning occurs in embodied experiences through meaning-making. The TPL model and features of playfulness can be used for designing, evaluating and developing PLEs and their pedagogical applications. The research also has much to offer teacher training. In 2007, the model will be tested through longitudinal experiments.

Challenging boundaries: Bridging activity systems through collaborative inquiry
Charles Max, University of Luxembourg, *Luxembourg*

This presentation will highlight learning experiences within the innovative BA in Educational Sciences at the University of Luxembourg. This program was launched in 2004 to meet the challenging demands of the multilingual and multicultural societal context. Luxembourg has two official languages, French and German, and a national language, Luxembourgish. About 40 percent of the population are non-native speakers, the majority are people with Portuguese origins. Forty-two percent of the children use at least two languages with their parents (Max, Portante, Stammet, 2005). The program emphasises a transdisciplinary approach to develop expertise on learning and teaching professionalisation in a life span perspective. Students experience a collaborative learning culture that challenges taken-for-granted boundaries such as theory-practice, research-training, teaching-learning, academic disciplines-school contents, university-school context. To achieve these aims the program stresses activities according to a sociocultural learning paradigm which draw upon cultural resources, human diversity and multi-professional cooperation. These experiences aim at empowering future teachers to create rich learning opportunities within local schools that draw on former/other experiences across boundaries, create continuity by integrating tools from everyday contexts, value children's cultural resources and "funds of knowledge" (Moll, 1992). The research uses cultural-historical activity theory (Engestroem et al., 1999) as theoretical framework for analysing the complex processes within a learning community and their transformative potential. It conceptualizes emerging conflicts and tensions as potential areas of rupture, innovation and change leading to learning and development. Data sources are audio-taped tutorials, interviews and learning portfolios. Particular emphasis will be paid to the tensions emerging, a) when actors engaged in a joint project move between different activity systems, b) when learning in competing systems is mediated through common boundary objects. The implications of the findings for designing teacher education will be discussed.

Invisible Differences: On the modeling process of teaching standards
Fritz Oser, University of Fribourg, *Switzerland*
Berno Stoffel, Swiss Pedagogical Institute Vocational Education, *Switzerland*
Albert Duggeli, University of Fribourg, *Switzerland*
Gian-Paolo Curcio, University of Fribourg, *Switzerland*

What teachers have in mind is actually an important research field regarding the quality of teaching and learning activities in classrooms. One field about teachers mind is concerned the construction and formulation of competence profiles; it has recently become a significant issue for teacher training and continuous education. We conceptualize teaching competence as the capacity to act in a professional, meaningful, and functionally appropriate manner in a particular situation. The measurement of this competence profile on a given level defines a standard. In our work, we develop and assess standards for vocational teachers. Drawing on an expert rating study (N=793), we have developed a theoretical framework that describes 45 holistic competence profiles rated as successful teaching elements in vocational schools. Further, we have constructed a video-based diagnostic instrument that informs teachers how well they master a standard. We present results of the validation study with 159 vocational teachers and 42 non-teachers. Participants viewed two film vignettes on group work and then answered a set of questions about various criteria: eight general dimensions of teaching quality (e.g., sympathetic understanding, effectiveness, motivation, etc.) and five standard specific dimensions (e.g., comprehensibility of the introduction, effectiveness of the group-formation, etc.). Based on a confirmatory factor analysis, we constructed 13 scales (alphas >.65;

F 21
29 August 2007 17:00 - 18:20
Room: 1.60
Paper Session

Team learning and organizations

Chair: **Eero Ropo,** University of Tampere, *Finland*

Learning as work in IT support. On the institutionalization of activities for learning in work life
Ann-Charlotte Eklund, Department of Education, Göteborg University, *Sweden*
Åsa Mäkitalo, Department of Education, Göteborg University, *Sweden*

This paper presents a sociocultural study of professional knowing and learning in a new kind of organization, namely that of IT support. Such practices have emerged as a response to the needs generated by an increased use of a broad range of technologies in society. The general aim of our project is to analyse how professional knowing is organized and maintained in such a workplace and how learning at work takes place. We have made participant observations of the team's work over a period of one year and have audio- and videorecorded core activities. To be regarded as an expert of technology in this field, and yet, to be of service in relation to a limitless need of support, create tensions and disturbances that have to be addressed strategically by the team. Such conditions of work have generated an organization characterized by no division of labour or assigned areas of individual responsibility. Instead, all tasks and responsibilities need to be shared by the team members. Mechanisms for individuals' functioning within the group and the group's functioning as a unit are thus crucial. From our observations we draw the conclusion that the

tensions and disturbances we have documented in this kind of organization, trigger the emergence and institutionalization of activities specifically arranged for learning. In the setting we have studied, one such recurrent activity is the 'Case studio'. These specifically arranged activities for learning have been video-recorded and analyzed. An interesting result of our analyzes is that these institutionalized learning activities serve to discuss quality of work in terms of the specific accountability constraints of the team and that the discussion at this meta level is characterized by the reinforcement of team norms. At the same time the institutionalized character of this communicative activity becomes a necessity for doing IT-support work.

Leadership, vision and organizational learning in school
Hanna Kurland, Oranim Academic College of Education, *Israel*

Schools are currently under pressure to adapt to rapid changes in society, and to improve educational outcomes. Researchers claim that leadership style, school organizational vision (SOV) and processes of school organizational learning (SOL) are the key theoretical concepts relating to school improvement (Fullan, 1995, 2002; Leithwood, 2004 ;Senge, 1990). The present study explored the relationships between principals' leadership style (transformational, transactional and laissez-faire), SOV and SOL processes. One hundred and four (104) Jewish elementary schools in Israel were studied (104 principals and 1,474 teachers). The school was the unit of analysis. Four organizational learning mechanisms (OLM's) were identified by using factor analysis: evaluation, staff involvement, information management, and in-school professional development. For the vision measure three factors emerged: mission, inspiration, and communication attributes. Hierarchical regression analyses indicated that leadership style predicted SOV and SOL processes in a similar pattern. The pattern of the prediction was positive and significant for transformational (the highest) and transactional leadership. Principals' laissez-faire leadership style predicted significant negative SOV and SOL processes. Finally, SOV was a strong predictor of SOL. The regression results suggest that SOV is the most powerful motivator of the process of organizational learning (OL) in school. Thus, the ability of the principal to create a collective vision with the teachers is a crucial component of school leadership. Vision motivates the staff to improve school functions.

Organizing the informal: how to find a balance in the initiation of communities of practice?
Sanne Akkerman, Utrecht University, *Netherlands*
Maarten de Laat, University of Exeter, *United Kingdom*

The notion of communities of practice has received great attention in educational and organizational practice and research. Though the concept originally refers to collaborative practices that emerge naturally, educational and HRD practitioners increasingly search for ways to intentionally create these practices in order to stimulate learning and professional development in specific fields. This paper is aimed at getting insight in the intricate balance in the initiation of communities of practice between deliberate organization and natural emergence. On the basis of studying the deliberate initiation of sixteen communities of practices in Europe within the tourist sector, guidelines are formulated for establishing a balanced reciprocal relationship between the initiator and the participants of the community of practice in order to successfully support informal learning. Besides offering practical guidelines, the study provides scientific insight in the pedagogy of communities of practice.

F 22
29 August 2007 17:00 - 18:20
Room: 0.100D
Paper Session

Problem solving

Chair: **Lucia Mason,** University of Padova, *Italy*

The effects of the contexts of questions in assessment on the performance of boys and girls
Tze Yung Chan, CCC Heep Woh College, *Hong Kong*
Siu LIng Wong, The University of Hong Kong, *Hong Kong*

The present study investigates the effects of the contexts of questions in assessment on the performance of boys and girls. Three versions of Force Concept Inventory (FCI) were developed, each with decontextualiszed questions, male-familarized-context questions and female-familarized-context questions respectively. 119 Secondary Four science students in a secondary school in Hong Kong participate in the study. All students completed the decontextualised-FCI as a pre-test. The students were then divided into two halves according to their performance of the pre-test and gender so that the composition of marks and the average marks, and the proportion of girls and boys of the two groups were almost the same and. Five weeks after the pre-test, one group completed the male-familiarized-FCI while the other group completed the female-familarized-FCI. Paired t-tests were applied to compare the performance of girls and boys in the two groups for each question in the pre-test and post-test. This study shows that familiar contexts can help students activate appropriate schemas when the familiarity is in terms of what they have come across be it everyday life contexts or simplified contexts in textbooks. However, questions with too rich contextual data have a negative effect on students' performance. For example, in problems dealing with ideal situations such as free falling, rich contextual data may distract students' comprehension of the task and activate students' schemas related to their common sense misconception rather than the learned correct concepts. Decontextualized problems may sometimes help students to consolidate some basic but abstract physical concepts, and facilitate them to bridge the concepts to the application of a wide range of different situations. The importance of decontextualized problems cannot be neglected. The findings of this study may inform teachers, textbook writers and examination setters to strike a balance between the amount of contextualized and decontextualized problems.

The influence of social context experiences and momentary affect on self-regulation strategies during problem solving
Julia H. Eksner, Northwestern University, *USA*

Aim: The adaptiveness of self-regulatory strategies has been conceptualized as hinging on self-regulatory strength that draws on internal resources of the individual (Muraven and Baumeister 2000). The aim of this study is to investigate if individuals' social environment, such as context stress and social resources, also contributes to self-regulatory strength. Hypothesis: The experience of high context stress is hypothesized to present a continuous drain on individuals' self-regulatory strength and to lead to temporary depletion of strength in alternative life spheres or domains, such as school-related tasks. This depletion is hypothesized to lead to less high-effort (optimization, compensation) and more low-effort (goal termination) strategies. Momentary affect is also hypothesized to be affected by experiences of stress, and is expected to contribute to the selection of strategies during the task. Methods: Study participants were immigrant public high school

students (15 male, 22 female) aged 14-19 years. Survey data on participants' stress experiences (life, neighborhood, acculturation, and racialization stress) was collected. During a quasi-experimental task subjects' self-regulation and momentary affect during an ecological problem solving task was assessed. Findings support the hypothesis as participants with high context stress selected significantly less adaptive high-effort, and more maladaptive low-effort strategies, while participants with more social support selected more adaptive high-effort, and less maladaptive low-effort, strategies during the task. Secondly, regression analysis yielded that social context (social resources and social support) act together with momentary affect as predictors of the selection of adaptive or maladaptive self-regulation strategies.

Researching the use of the 'double number line' as a mathematical model: The role of collective argumentation.
Christina Misailidou, University of Stirling, *United Kingdom*

The aim of the study reported here is to examine the effectiveness of the 'double number line' as a model for facilitating mathematical problem solving. The use of the double number line is investigated within the context of a collective argumentation approach informed by sociocultural theories of learning. The paper reports results on the development of arguments from a group of pupils working collaboratively on an item called 'Printing Press'. A double number line was used as a tool for facilitating discussion. The paper focuses on the discourse of one particular pupil that provided an erroneous answer to the item in previous testing. The evolution of her argumentation is represented by using Toulmin's terminology in what is labelled as a 'discursive path'. Both of the stages of this pupil's discursive path are provided and two factors that provoked the change in her discourse are traced: a. The introduction of the model of the double number line in the group discussion and b. The discursive interactions between the pupil and her peers which were mediated by the model. The paper concludes by proposing a new, to the relevant literature, methodology on the use of complicated models such as the double number line. It is proposed that an effective use of such a model could be supported by a carefully designed approach that involves methodically orchestrated discursive interactions between the pupils, mediated by the model.

Fostering conceptual understanding of simple electricity by combining simulation and laboratory activities
Tomi Jaakkola, University of Turku, *Finland*
Sami Nurmi, University of Turku, *Finland*

Previous research has shown that gaining understanding on electricity seems to be very challenging and difficult for students in all school levels, and earlier attempts to address these difficulties have proven only partially effective. The aim of this paper was to study the effectiveness of online simulation, laboratory exercise and simulation-laboratory combination to foster conceptual change in learning simple electricity at K-12 level. Results of this experimental study showed that the simulation-laboratory combination was the most effective learning condition. Although most students in each condition learned the correct circular model concerning the conception of closed circuit, the combination condition was superior in fostering the development of students' understanding on series and parallel circuits when compared to the two other conditions. Results of the research provide encouraging evidence for using simulation together with hands-on laboratory exercise. Simulation can help students to first understand the theoretical principles of electricity by revealing the behaviour of electric circuit and visualizing the current flow in the circuit. Understanding the basics of electricity on a theoretical level makes it easier to transfer acquired knowledge into the laboratory exercise and, as a consequence, develop more coherent and holistic comprehension of the topic. Thus the combination of laboratory and simulation can bridge the gap between theory and reality.

G 1
30 August 2007 08:30 - 10:30
Room: 0.87 Marx
SIG Invited Symposium

New issues and methods in text and graphics comprehension research

Chair: **Shaaron Ainsworth,** University of Nottingham, *United Kingdom*
Chair: **Eduardo Vidal-Abarca,** University of Valencia, *Spain*
Organiser: **Eduardo Vidal-Abarca,** University of Valencia, *Spain*
Organiser: **Shaaron Ainsworth,** University of Nottingham, *United Kingdom*
Discussant: **Wolfgang Schnotz,** University of Koblenz-Landau, *Germany*

Computer-based technology opens new possibilities for researchers to deal with new issues and methods to investigate on-line processes when people understand and learn with text and graphics. This research will produce a better understanding of why some students reach good levels of understanding and learning, whereas some others do not. Magliano and colleagues will present a new test of reading comprehension called the Reading Strategy Assessment Tool (R-SAT) that elicits and analyzes automatically verbal protocols that readers generate as they read narrative, historical, and scientific texts. Ainsworth and colleagues explores how techniques developed in computational linguistics and machine learning could be used to help code verbalizations produced when students self-explain diagrams of the cardio-vascular system. Boucheix will present results based on eye tracking technologies that get precise behavioural indicators of students' underlying processes when they understand animated and multiple representations of complex mechanical systems. Tabbers's presentation will deal with research studies using the dual-task paradigm to investigate the role of working memory processes when people learn from text and pictures.

Validating the Reading Strategy Assessment Tool (R-SAT)
Joseph P. Magliano, Northern Illinois University, *USA*
Keith K. Millis, Northern Illinois University, *USA*
Sara Gilliam, Northern Illinois University, *USA*
Irwin Levinstein, Old Dominion University, *USA*
Chutima Boonthum, Old Dominion University, *USA*

We are constructing a new test of reading comprehension called the Reading Strategy Assessment Tool (R-SAT). R-SAT elicits and analyzes verbal protocols that readers generate as they read narrative, historical, and scientific texts. R-SAT is administered on the computer. R-SAT employs word matching algorithms to assess the quality of test takers' protocols. After reading pre-selected target sentences, R-SAT readers are asked to produce one of two types of open ended responses: indirect and direct. The indirect approach requires readers to report thoughts regarding their understanding of the sentence in the context of the passage. In the direct method, the reader answers a "wh-" question about the text. Indirect protocols provide an assessment of reading strategies, whereas direct protocols provide an assessment of a reader's ability to access important prior text information while reading. Three forms of R-SAT have been constructed. The goal of the present study was to assess the extent to which these forms are indicative of comprehension and to compare R-SAT to a traditional standardized reading comprehension test, the Gates-McGinitie (G-M). Participants were administered both R-SAT and the G-M. They also read silently and answered short answer questions to other texts, which provided the criterion

assessment of comprehension. Data are presented that indicate R-SAT exceeds the amount of comprehension variance explained in comparison to the G-M.

Automatic coding of learners' self-explanation when learning from diagrams
Shaaron Ainsworth, University of Nottingham, *United Kingdom*
Richard Forsyth, University of Nottingham, *United Kingdom*
David Clarke, University of Nottingham, *United Kingdom*
Laura Robertson, University of Nottingham, *United Kingdom*
Claire O'Malley, University of Nottingham, *United Kingdom*

To understand learning with text and graphics, researchers typically take advantage of process measures such as verbal protocols. However, analysing an hour of protocols can take from ten to fifty hours. Therefore, we are interesting in exploring how techniques developed in computational linguistics and machine learning could be used to help code verbalisations. Our approach (CODELEARNER) suggests that a system should have three key functions: accuracy (system and human coder assign the same code), economy (number of examples a researcher has to code to train the system) and predictability (whether a system can estimate its own performance from a smaller subset of data). To test the system, we compared its performance to human coding of self-explanations given by learners studying concrete or abstract diagrams of the heart. There were 23,330 words, sectioned into 1784 different segments and the human coder decided that 699 of these segments were self-explanations, 1022 were paraphrases and 63 were monitoring statements. CODELEARNER's accuracy was 75% when trained with 1600 example segments. However, the Cohen's Kappa (0.52) would not be deemed satisfactory for inter-rater reliability in standard experimental situations. CODELEARNER's was more successful at economy exhibiting a steep learning curves (see Figure 1), providing the system with only 300 coded segments allows it to achieve an accuracy rate of 70%. CODELEARNER was successful at predicting its level of accuracy with a larger training set. It can accurately predict how well it will do with datasets twice the size as the one it was provided with.

On-line methods to study dynamic representations processing: Eye tracking and comprehension
Jean-Michel Boucheix, Universite de Bourgogne, *France*

In the current research about the comprehension of animated and multiple representations, on line methods stay very few. But new eye tracking technologies allow to get more precise behavioural indicators: fixations number and duration, transitions between selected area of interest in the picture, precise eye trajectory, and scan paths. These measures can be newly combined with off-line comprehension investigations. This presentation aims to show the relevance and also the limits of such on-line methods to study multimedia comprehension. Two researches about different kind of animated multimedia presentation will be exposed. The first study concerns the comprehension of a complex mechanical system from an animated and controllable display. The second research investigates, also with the eye tracking technique, the topic of the collaborative comprehension in technical learning from multiple representations.

Putting the assumptions to the test: Working memory processes in learning from text and pictures
Huib Tabbers, Erasmus University Rotterdam, *Netherlands*

Theories stressing the involvement of working memory resources in learning from text and pictures are seldomly tested on their assumptions. Most of the times, design guidelines are tested on learning outcomes and not on their underlying cognitive processes. An interesting method for

studying working memory processes is the dual-task paradigm. Giving a secondary task that taxes a specific memory subsystem can reveal the relative involvement of this system in learning. Recently, a number of studies have been published that used the dual-task paradigm to investigate working memory processes in learning from text and pictures. However, these studies have produced inconclusive results, which can largely be attributed to differences in how the dual-task method has been applied. Guidelines are needed on how to set up dual-task studies that can properly deal with theories on learning from text and pictures and put their assumptions to the test.

G 2

30 August 2007 08:30 - 10:30
Room: 0.65
SIG Invited Symposium

Getting religiously and spiritually involved

Chair: **Kirsi Tirri,** University of Helsinki, *Finland*
Organiser: **Kirsi Tirri,** University of Helsinki, *Finland*
Organiser: **Zehavit Gross,** Bar-Ilan University, *Israel*
Discussant: **Wiel Veugelers,** University of Amsterdam/University of Humanistics, *Netherlands*

In this symposium we investigate the roles of religious and spiritual development, learning, self-esteem and spiritual sensitivity in religious and spiritual involvement. We explore religious engagement of different populations with international data sets using both quantitative and qualitative approaches. Kirsi Tirri from Finland presents empirical findings on spiritual sensitivity of young adults who don't go to church. According to the results, adults who don't go to church still express needs for spirituality. Religious education in schools provides tools for religious understanding for students. Elina Hella from Finland presents suggestions for using variation in religious education classroom to promote religious understanding of secondary school students. Carmine Maiello from Switzerland presents empirical evidence of the correlates between religiosity and social engagement. Zehavit Gross presents results on how Israeli Jewish adolescents (N=852) who are deeply rooted within modernity perceive their religious identity, values and worldviews. We have two discussants in this invited symposium. Wiel Veugelers comes from the humanistic tradition and makes remarks from that tradition. Terry Lovat represents more religiously oriented approach and discusses the papers from that perspective. Together the papers and discussants give room to both religious and spiritual points of views.

Spiritual sensitivity of young adults
Kirsi Tirri, University of Helsinki, *Finland*

This study reports results on spiritual sensitivity of young urban adults (N=500). These adults represent people who are not religiously involved. However, they do express spirituality without being religious. The spiritual sensitivity of these adults is measured with spiritual sensitivity scale consisting of four dimensions: Awareness sensing, mystery sensing, value sensing and community sensing (Tirri et al. 2006). The results show differences in spiritual sensitivity between males and females. Furthermore, young adults differ from other populations in the community sensing dimension of spirituality. They express less need to belong to a community and prefer individuality in their expression of spirituality.

Phenomenography and the variation theory of learning as pedagogical tools for religious education
Elina Hella, University of Helsinki, *Finland*

This paper introduces phenomenography and the Variation Theory of Learning (e.g. Marton et al. 2004) as potentially effective pedagogical tools to help students to relate to and make sense of the variety of worldviews and belief systems. It is argued, that phenomenography serves as a tool for researchers and teachers of religious education to discern and relate together qualitatative differences in understanding a particular religious subject matter from different perspectives. The Variation Theory of Learning, developed within phenomenographic research tradition, focuses on how the qualitative differences between students' ways of understanding a particular phenomenon are linked to their ability to discern the critical aspects of that phenomenon. From the framework of the Variation Theory of Learning, it is argued, that to understand the uniqueness of a particular 'religious' worldview, variation must be experienced within religious worldviews as well as between religious and non-religious or secular worldviews. Religious education can help students to discern features of a particular religious tradition by exposing students to experience variation in that tradition in contrast with alternative traditions. Hence, students can make sense of the diversity of worldviews by comparing similarities and differences between contrasting perspectives or features in order to discern one from the other. Illustrations of how religious meanings are discerned and constituted by the students and teachers of religious education in Finnish upper secondary schools are drawn from a phenomenographic study to support the arguments (Hella, forthcoming).

Religiosity and personality
Carmine Maiello, University of Fribourg, *Switzerland*

This study examines the relationship between religiosity as measured by the Degrees of Belief in God scale (Maiello, 2005, 2006) and several factors of personality including self-esteem, gender, extraversion, neuroticism, trait-anxiety and depression. Standardized questionnaires were administrated in all Swiss schools located in the counties of Berne, Basel and Zurich thus covering most of the German speaking part of Switzerland. Subsequently, a total sample of 2124 high school students (1129 males, 985 females, 10 gender indications missing) aged between 15 and 23 (Mean = 18, Mode = 18) was used to test a priori designed causal models of religiosity and personality. Results reveal that personality and religiosity are linked in various non linear and indirect ways. Particularly, there is evidence of a curvilinear relationship between depression and religiosity. Furthermore, the data are consistent with a proposed model of personality and religiosity that includes a feedback loop between neuroticism and religiosity as well as indirect effects of extraversion and positive effects of self-esteem on religiosity. With reference to self-esteem no correlation with religiosity is observed at a zero-order level. But, controlling for anxiety surprisingly reveals a positive beta coefficient. Although it has been reported that women generally score higher on belief scales than men (Dieckmann & Maiello, 1998) no gender differences were found in this study using a sample of 18 year old students. The results of this study have several theoretical implications and offer the potential for important clinical applications. With reference to theory and clinical treatment the outcome of a feedback-loop between neuroticism and religiosity is particularly relevant. It resolves issues of consistency found in the literature in which neuroticism has been contradictorily reported to be correlated either positively or negatively with religiosity.

New wine in an old jar: Israeli Jewish adolescents religious practices, values and worldviews in a modern World
Zehavit Gross, Bar-Ilan University, *Israel*

The aim of this quantitative research is to analyze how Israeli Jewish adolescents (N=852) who are deeply rooted within modernity, as an integral part of their school socialization which is basically modern, perceive their religious identity, values and worldviews which are basically rooted within traditionalism. The findings show that in terms of religious practice (Mitzvot) and belief (Emunah), Israeli society and adolescents seem relatively traditional. A gap was found between the theoretical attitude towards religious experience and the practical religious experience. There was found a strong appeal for a form of religiousness that emphasizes the experiential aspect rather than the practical aspect. A negative correlation was found between xenophobia and the so-called secular religious worldviews and a positive correlation between xenophobia and Jewish worldviews. The explanation for these findings should take into account the unique historical and cultural Jewish circumstances. Jews were for many years a minority in their countries of residence. Their Jewish religion was a means to preserve them from assimilation. The establishment of a modern civilian Jewish state is part of normalization processes of the Jewish nation and thus it challenges these traditional Jewish convictions. A more pluralistic and open education alongside with religious education which is more about religion rather than merely as a practical learning (attendance in synagogue and faith) will narrow potential dissonance cognitive and enable those adolescents to better adjust themselves to the modern world they live .

G 3
30 August 2007 08:30 - 10:30
Room: 1.71 Pócza
SIG Invited Symposium

Reframing the concepual change approach in learning and instruction

Chair: **Gunilla Petersson,** Karolinska Institute, *Sweden*
Chair: **Xenia Vamvakoussi,** University of Athens, *Greece*
Organiser: **Xenia Vamvakoussi,** University of Athens, *Greece*
Organiser: **Gunilla Petersson,** Karolinska Institute, *Sweden*
Discussant: **Stella Vosniadou,** University of Athens, *Greece*

The conceptual change approach has emerged from an effort to provide answers to questions regarding the re-organization of conceptual knowledge. Over the years, criticisms coming from socio-cultural perspectives of learning, as well as from researchers interested in other factors influencing learning, such as motivation and personal epistemologies, has brought forward aspects of learning that have been neglected in initial accounts of conceptual change. This symposium aims at reframing the conceptual change approach in learning and instruction, in light of recent theoretical considerations and empirical evidence . The contributors take different perspectives on the issue of conceptual change. Ola Halldéên, Åsa Larsson, and Liza Haglund explore different models and metaphors used to explain conceptual change and emphasize that models have to be explicitly related to methods of inquiry in order for taking different aspects, such as the context dependence of concepts and emotional factors, into account. Gale Sinatra argues for a multi-faceted view of conceptual change learning that takes into account cognitive, affective, situational,

and motivational factors and she points out the importance of the learner's characteristics in the interactive process of conceptual change. Gregg Solomon discusses, from the perspective of a program director at an agency that funds research on learning and instruction, missteps commonly seen in research proposals looking at conceptual change and its educational implications. Patricia A. Alexander and Daniel L. Dinsmore visit the literature on expertise development to address the question how to guide someone from conceptual naivetéê to conceptual sophistication. Marcia C. Linn examines different views on conceptual change and argues for the value of the knowledge integration view for the design of effective instruction. The discussant, Stella Vosniadou, will attempt to provide an integrated view of the different aspects of conceptual change learning elaborated by the presenters.

On the emergence of a conception:Metaphors and models in research on conceptual change
Ola Hallden, Stocholm University, *Sweden*
Asa Larsson, Stocholm University, *Sweden*
Liza Haglund, Stocholm University, *Sweden*

Models and metaphors used to explain conceptual change are explored. One common model for describing conceptual change has been that of a conception A being exchanged with another conception B. This was the way Piaget described the child's acquisition of culturally agreed conceptions in his early works on the child's conception of the world and the child's construction of reality. The exchange model was also the one adopted in the rapidly growing research on conceptual change in science that began in the seventies. The predominant idea was that the learner have to abandon commonsense conceptions in favour of scientific ones. In parallel to this exchange model there was also other models advocated. It was argued that we do not always abandon old conceptions when we acquire new scientific ones but rather that the learner has to differentiate between explanations in everyday life and in scientific contexts respectively. In contemporary research there is almost an agreement that conceptions are embedded in conceptual systems. Still, there is a debate about the concept of concept and what there is that changes in conceptual change. The criticism of constructivist approaches from sociocultural theorists has also resulted in an awareness of the context dependence of concepts. Also, emotional factors have been brought to the fore in accounting for the process of conceptual change. All of this has to be accounted for in modelling the process of conceptual change. Here, different models are discussed and it is argued that models have to be explicitly related to methods of inquiry in order for taking these different aspects into account.

A Multi-faceted view of conceptual change learning
Gale Sinatra, University of Nevada, *USA*

The view of conceptual change that is emerging from the warming trend (Sinatra, 2005) is one of a multi-faceted, theoretically complex, and interactive process. Sinatra and Mason (in press) argue that conceptual change should not be examined through only one lens as either a cognitive, developmental, or sociocultural process, but rather multiple lens are needed to understand the complexities of conceptual change learning. Specifically, the acceptance of a multi-faceted view of conceptual change is necessary to advance our understanding of this complex process. Sinatra and Mason (in press) describe conceptual change as ranging from algorithmic (or automatic) to intentional (conscious and deliberate) using a levels of awareness framework (for various characterization of a levels view see Anderson, 1990; 1991; Craik & Lockhart, 1972; Newell, 1990; Stanovich, 1999). Key to understanding this multi-faceted view of conceptual change learning is an examination of the role learner characteristics play in the interactive process of

conceptual change. In this presentation I will discuss this multifaceted, multiple lens view of conceptual change learning and I will touch on how individual differences in constructs such as mastery goals, epistemological beliefs, personal interest, importance, values, achievement goals, self-efficacy, and control beliefs can play a determinative role in intentional conceptual change.

Re-conceptualizing conceptual change: What expertise development has to contribute
Patricia Alexander, University of Maryland, *USA*
Daniel Dinsmore, University of Maryland, *USA*

Within the educational research literature there is wide acceptance of the fact that the conceptual knowledge of experts differs from that of non-experts both quantitatively and qualitatively. There is also acknowledgment that experts and novices may approach domain-specific problems in distinct ways or may treat anomalous data differently. Even the typical mis-conceptions of experts and non-experts are presumed to vary significantly. Although the expertise research has been fertile ground for ascertaining the apparent contrasts in mental representations, problem-solving strategies, and misconceptions between true novices and acknowledged experts, that rich literature has been less useful in understanding how to support conceptual development in those journeying toward expertise. In essence, simply knowing that experts and novices are different does not necessarily tell us how to guide someone from conceptual naivetéê to conceptual sophistication in any domain. In this presentation, we will revisit the extant literature on expertise development, as framed within the Model of Domain Learning (MDL) to address this "how" question. Specifically, we will explore how the MDL can inform efforts to facilitate conceptual development in less expert populations through simultaneous attention to principled knowledge, strategic processing, and motivational factors, especially individual interest.

Teaching for conceptual change: Distinguish or extinguish ideas
Marcia Linn, University of California, Berkeley, *USA*

The nature of conceptual change is contested. Some see students following a trajectory consisting of the accumulation of knowledge, consistent with the lecture method of instruction. Others see conceptual change as constrained by developmental processes and perhaps unresponsive to instruction. Recently an emerging view of conceptual change focuses on the broad range of ideas that students articulate. My research on the knowledge integration perspective argues that conceptual change results from efforts to build on ideas that students generate spontaneously, opportunities to add ideas that stimulate reconsideration of existing ideas, efforts to build criteria that distinguish idea, and opportunities to reflect on the mix of ideas. Students who engage in knowledge integration seek to add new ideas, actively sort out their ideas, take advantage of evidence from a range of sources including their personal experiences, and deliberately attempt to build coherent understanding. Contrasting these views of conceptual change raises some issues that all the theories of conceptual change need to address including the role of memory and forgetting, problem context, intuitive beliefs, grain size of the ideas, and successful instruction. In this paper I discuss these issues and seek to integrate the varied perspectives on conceptual change.

G 4
30 August 2007 08:30 - 10:30
Room: -1.63
Symposium

There is no such thing as cheating and plagiarism: Only how we define it

Chair: **Hakan Hult,** Linköping University, *Sweden*
Organiser: **Torgny Ottosson,** Kristianstad University, *Sweden*
Discussant: **Per Lauvas,** Ostfold University College, *Norway*

This symposium contributes to discussions of how cheating and student plagiarism is construed. Both are often portrayed as threatening academic quality and as evidence of students' disregard for values. Graduating plagiarists or cheaters might lack skills to function effectively, become plagiarising researchers and otherwise threaten knowledge. We use the symposium to argue for alternative perspectives. Evidence suggests 90% of students plagiarise at least occasionally and many cheat. Re-using others' text is arguably a natural and predictable expression of intertextuality; it cannot always be unethical since even expert paraphrasers often leave substantial reproductions of the original text in their 'new version'. Academic culture is generally regarded as stable yet it has shifted over 300 years from regarding copying as the preferred way to demonstrate learning to instead, valuing unique and individualised work. Conventions for attribution, footnoting and paraphrasing have also evolved. Given this context, we ask if plagiarism might more appropriately be viewed as a failure of the Academy to teach students the required writing skills and cheating as students' attempts to navigate unknown systems. Either might result from teachers' failures to find appropriate ways to assess learning and/or encourage and support academic integrity. We argue for more nuanced ways of labelling practices that range from the unethical (e.g., buying papers from so-called 'paper mills') to the seemingly trivial (e.g., citing without exact use of attribution) other than moral panic. Papers presented deal with issues of media influence on discourse; academic culture and writing; and the use of software for writing reports, for plagiarism detection and deterrence. The ultimate questions are whether current concepts of cheating and plagiarism reflect the real world and whether, in their current manifestation, the concepts can inhibit students' learning.

Reclaiming the issue of student plagiarism: The impact of external agents and agencies on universities' management of student plagiarism
Jude Carroll, Oxford Brookes University, *United Kingdom*

Writers about student plagiarism commonly begin their paper or article by mentioning the high level of interest which the topic seems to attract. This paper addresses the nature of that comment. More importantly, it considers the impact which those outside the academy (for example, journalists, politicians and social commentators) have had on decisions and procedures adopted within it for dealing with student plagiarism. Plagiarism is a pedagogic issue yet can so easily be bound up with unhelpful assumptions about students' morals, the integrity of awards, and even the frequency of cases. The paper uses discourse analysis and longitudinal case studies to inspect a range of recent articles and pronouncements from several countries including the UK, Australia, New Zealand and Sweden. It identifies and documents the impact that journalistic practices, certain kinds of language and individual campaigns have had on academic decisions and

procedures. Journalists in particular, choose certain types of metaphors. They seem to insist on 'shock and horror' language and are prone to creating (often fictional) examples of student cheating, In so doing, they risk creating fear rather than understanding; in the guise of 'calling for action', they risk impeding it. Deterring and managing student plagiarism is best accomplished as a normal part of academic activity. The paper calls for action so that academic judgments and students' learning underpin how institutions understand and deal with instances of plagiarism.

Academic dishonesty, ethical norms and learning
Gunnel Colnerud, Linköping University, *Sweden*
Michael Rosander, Linköping University, *Sweden*

The aim of this paper is to deduce which ethical norms and considerations are implicitly present in students' answers when they are asked to define the degree to which a number of presented actions constitute acts of academic dishonesty. The study asked 325 students from four educational programs to answer a Likert-scaled questionnaire. Their task was to value 23 situations and state whether they considered them to be cheating. A statistical analysis of the results formed the basis for a subsequent qualitative analysis which sought to deduce students' ethical norms. It was asked: What characterises the items regarded as academic dishonesty and those not regarded as academic dishonesty? The theoretical background for the study is derived predominantly from consequentialist, teleological, and deontological theory. It is possible to observe an implicit logic in the students' attitudes towards the degree of academic dishonesty by interpreting the results in terms of his or her learning. The study assumes that the lower the degree of effort and work exhibited by the student, the lower the degree of learning can be expected. Qualitative analysis of the students' judgements showed that the lower the student's expected learning, the higher they defined the degree of academic dishonesty. If a student breaches an academic norm but still learns parts or most of the task, the students' answers show that it is more acceptable than if he or she has done no work and consequently has learned nothing (of the task). If an act of academic dishonesty results in learning it can be theoretically justified by two arguments. The first is deontological – if you learn, you fulfil your duty. The second is teleological – if you have learned, then your mark is fairly achieved and you do no harm to other students.

The use of 'electronic detection systems' for learners: Is there a pedagogic argument or are we just 'teaching them to cheat'?
Lisa Emerson, Massey University, *New Zealand*
Mary Davis, Oxford Brookes University, *United Kingdom*
Jude Carroll, Oxford Brookes University, *United Kingdom*

Views differ markedly as to the place of electronic text-matching tools in addressing student plagiarism. Studies tend to concentrate on functionality, reliability and utility of current systems and/or case studies of their introduction. This study explores evidence that software designed to help teachers identify student plagiarism can be a teaching tool to help students learn the skills necessary to avoid it. The paper uses data gathered in two countries (New Zealand and the United Kingdom) and in a range of educational settings. Findings include students' experiences of using text-matching tools and how the feedback, especially if teacher-mediated, helps students understand and use acceptable citation practices. The tool involved is Turnitin, used widely in the UK, US, Canada, Australia and New Zealand. Recommendations designed to improve use with specific groups of students as well as issues which continue to cause for concern are explored. The paper serves as an argument for placing student learning at the heart of any approach to dealing with student plagiarism and addresses the concerns of teachers who fear that allowing students

access to something designed to 'catch them' will weaken the efforts and further undermine attempts to safeguard academic standards.

"But you're not supposed to rip it straight off": Technology, plagiarism and dilemmas of learning in ill-structured domains
Lars-Erik Nilsson, Kristianstad University, *Sweden*
Anders Eklof, Kristianstad University, *Sweden*
Torgny Ottosson, Kristianstad University, *Sweden*

In discourses on student plagiarism, how students use technology is often viewed as threatening the quality of education. Students are positioned as plagiarists who copy and paste or download full essays with the explicit purpose of cheating. Their actions are more commonly judged in reference to the need for upholding discipline rather than upholding learning. This paper argues that learning environments are rapidly changing, and these changes introduce increased uncertainty – uncertainty that students need to manage. By assuming that students use technology to cheat, we risk obscuring the real dilemmas which students confront as they strive to manage uncertainty. One aim of this study is to go beyond simplified categorizations of technology use. Instead, we suggest focussing on how students make sense of their use of technology. What do they do in practice? Data was collected via video recording of students' use of technology in problem-based and collaborative learning. Three cases where students must make sense of their experiences are reported, illustrating uncertainties in learning highlighted by students' use of technology. Results indicate that students spend considerable time making sense of their assignment. Students who have formulated questions may still be unsure as to what might constitute acceptable answers. Their uncertainty impacts on how they search for and value information and how they manage it, once found, in their writing. They encounter dilemmas as they seek to treat texts in accordance with rules for paraphrasing, attributing and referencing. These dilemmas are inflected by use of technology. Rather than being characterised as blatant attempts to plagiarise (as some concerned pundits might suggest), student actions suggest an uncertainty about how to manage information and to then subsequently write text. The act of plagiarism can be more accurately characterised as a dilemma emergent in students' attempts to manage their uncertainty.

G 5
30 August 2007 08:30 - 10:30
Room: 2.54 Novobátzky
Symposium

Scripting computer-supported collaborative learning: Theoretical and methodological challenges

Chair: **Päivi Häkkinen,** University of Jyväskylä, *Finland*
Organiser: **Päivi Häkkinen,** University of Jyväskylä, *Finland*
Organiser: **Armin Weinberger,** Ludwig Maximilians University Munich, *Germany*
Organiser: **Martin Valcke,** Ghent University, *Belgium*
Discussant: **Angela O'Donnell,** Rutgers University, *USA*

Successful collaborative learning depends upon effective interaction amongst learners. However, when learners are left on their own, they rarely engage in productive interactions such as asking

each other questions, explaining and justifying their opinions, articulating their reasoning, or elaborating and reflecting upon their knowledge. Collaboration scripts have recently been presented as a promising method to trigger these activities and to provide structure and support for open learning environments. Scripts aim to foster collaborative learning in shaping the way in which learners interact with one another. They may define for each phase what task the students have to perform, the composition of the group, the way the task is distributed, the mode of interaction, and the timing of the phase. Computer-supported scripts can be designed to facilitate collaborative learning in different ways. On the one hand, they can scaffold the interaction process per se by providing prompts, sentence starters etc. On the other hand, they can set up conditions in which favourable activities and productive interaction should occur. Beyond structuring specific activities and interaction patterns, scripts may also orchestrate individual and collaborative activities as well as virtual and physical activities within the classroom over longer time segments. However, it is also evident that scripted collaboration does not happen without problems and challenges, but different groups will act differently regardless of the same instructional interventions and environments. This symposium brings together researchers who have focused on designing scripts and evaluating their impact in computer-supported collaborative learning settings. These settings vary in terms of social levels, time-scale, tools, participants etc., but common for all of them are the theoretical and methodological challenges related to the application of computer-supported scripts.

Scripting collaborative problem solving with the Cognitive Tutor Algebra: A way to promote learning in mathematics

Nikol Rummel, Psychologisches Institut, Albert-Ludwigs-Universit, *Germany*
Dejana Diziol, Psychologisches Institut, Albert-Ludwigs-Universit, *Germany*
Hans Spada, Psychologisches Institut, Albert-Ludwigs-Universit, *Germany*
Bruce McLaren, Human Computer Interaction Institute, Carnegie Mel, *USA*

Interest in developing improved instructional methods for mathematics has increased since TIMSS and PISA. In our project, we introduce a new way to promote knowledge acquisition in mathematics: we enhanced the Cognitive Tutor Algebra I, an intelligent tutoring system for learning mathematics in high school that only has been used for individual learning so far, to a collaborative learning setting. Although the Tutor has shown to increase learning, there also are several shortcomings. For instance, learning with the Tutor places emphasis on improving students' problem solving skills, yet a deep understanding of underlying mathematical concepts is not necessarily achieved. To reduce these shortcomings, we extended the learning environment to a dyadic setting, adding new learning opportunities such as the possibility to mutually elaborate on the learning content. A script was developed to guide students' interaction and to ensure that students profit from these new learning opportunities. The script structured students' collaboration in an individual and a collaborative phase and prompted students to engage in fruitful interaction. An adaptive script component provided hints when the dyad encountered difficulties in problem solving. Finally, dyads engaged in a reflection activity following each problem to improve their collaboration over subsequent interactions. The scripts' effect on students' collaborative learning was tested in a classroom study that took place over the course of one week. We compared the learning of dyads collaborating at the Tutor without script support to the learning of dyads scaffolded by the script. To measure different aspects of learning, students solved several post tests on the Tutor and with paper and pencil. The results of the paper and pencil test assessing improvement of students' conceptual understanding show significantly better performances of the script condition. The Tutor log data are still being analyzed and the results will be presented at the conference.

Do we learn through collaborative argumentation? A study on argumentation, cognitive processes and knowledge acquisition in computer-supported collaborative learning
Karsten Stegmann, Ludwig Maximilians University Munich, *Germany*
Armin Weinberger, Ludwig Maximilians University Munich, *Germany*
Christof Wecker, Ludwig Maximilians University Munich, *Germany*
Frank Fischer, Ludwig Maximilians University Munich, *Germany*

Several studies on collaborative argumentation are based on the assumption that to foster the quality of learners' arguments in discussions leads also to improved individual learning. More specifically, understanding and formulating sound arguments in discussions is considered as being associated with deep cognitive processing. Deep cognitive processing, in turn should promote understanding and acquisition of the concepts discussed. This, in turn, is supposed to improve the quality of arguments in the discussion. Although plausible, empirical investigations of these assumptions are rare, mainly because it has been quite difficult to analyze individual cognitive processes during collaborative argumentation. The goals of this study are to examine these assumptions. A one-factorial design (n = 48) was used to investigate the relation between the quality of arguments (low vs. high, manipulated via a collaboration script) during online discussions of groups of three, cognitive processes (which can be studied quite well in asynchronous online discussions, because learners can be asked to think aloud during collaboration), and knowledge acquisition. Results show that the quality of arguments during discussion is positively related to deep cognitive processing. Moreover, the quality of arguments had a positive effect on the individual acquisition of argumentative knowledge. The findings of this study provide support for the assumptions that high quality collaborative argumentation is associated with deeper cognitive processing as well as with the acquisition of knowledge of the individuals participating in a discussion.

The design and implementation of the ConceptGrid
Taiga Brahm, SCIL, University of St. Gallen, *Switzerland*
Pierre Dillenbourg, Swiss Federal Institute of Technology, EPFL, *Switzerland*
Fabrice Hong, Swiss Federal Institute of Technology, EPFL, *Switzerland*

This contribution presents and evaluates how the ManyScripts environment enables teachers to design a script, prepare a session and orchestrate the activities in real time. Currently, the environment, called ManyScripts, includes the script called 'ConceptGrid'. For this script, groups of students first have to distribute roles (corresponding to theoretical approaches) among themselves. In order to learn how to play their roles, students have to read papers that describe the theory underlying their role. In the next step, each group receives a list of concepts to be defined. Students then write definitions of the concepts that were allocated to them. In order to complete the grid, groups have to assemble these concepts and to define the relationship between grid neighbours. The key task is to write 5 lines that relate or discriminate two juxtaposed concepts. During the debriefing session, the teacher compares the grid produced by different groups and asks them to justify divergences. To use a ConceptGrid script in her course, the teacher has to decide about the group size (number of roles) and edit the contents of the script: she defines the roles, the papers to be read for each role and the sets of concepts to be defined and assembled in a grid by the student groups. When the script is running, the teacher has the possibility to change some parameters such as the group composition or deadlines up to a certain level. The ManyScripts environment enables the teacher to follow the evolution of teamwork at a high level of aggregation. This new release of the ConceptGrid is currently used and studied at EPFL and the

University of St. Gallen/Switzerland. The results of the empirical studies will be reported at the symposium.

Fostering university students' knowledge construction in asynchronous discussion groups by means of the use of knowledge types
Tammy Schellens, Department of Education, Ghent University, *Belgium*
Hilde Van Keer, Department of Education, Ghent University, *Belgium*
Bram De Wever, Department of Education, Ghent University, *Belgium*
Martin Valcke, Department of Education, Ghent University, *Belgium*

The present study focuses on the use of a particular kind of scripting, namely the use of knowledge types as a possible way to structure university students' discourse in asynchronous discussion groups and consequently promote their learning. More specifically, the aim of the study is to determine how requiring students to label their contributions by means of knowledge types, has an impact on the knowledge construction processes reflected in the discussion. More specifically, students were asked to label each contribution with a category reflecting one of the stages of the progressive inquiry model. The categories that were provided were "Problem", "My Explanation", "Scientific Explanation", "Evaluation of the Process", and "Summary". This script is based on the FLE3 knowledge building environment. The results suggest that the use of knowledge types significantly affects the knowledge construction processes. More specifically, it appears that requiring students to reflect on the type of message in their contributions stimulates significantly higher levels of knowledge construction reflected in students' messages as compared to a control group engaged in regular asynchronous discussions without requirements with regard to labelling the knowledge type reflected in one's contributions.

Dynamics of collaboration process during a scripted online course in university settings
Raija Hamalainen, IER, University of Jyväskylä, *Finland*
Maarit Arvaja, IER, University of Jyväskylä, *Finland*
Päivi Häkkinen, IER, University of Jyväskylä, *Finland*

Collaboration scripts can guide the participants in dealing with the learning task, help them to choose appropriate roles to play as well as to organise and to sequence the various activities they are supposed to engage in. This study explores how three different types of pedagogical scripts guided groups' collaboration processes, how groups' activity level and types of activities vary during a scripted university course. This study is a design-based study, in which the participants were the first-year teacher education students (N=30) studying the pedagogy of education for a period of three months. Three different scripts (Case, Grid and Open-problem) were employed to make learning more efficient. These three scripts formed a "macro-script" for the whole online course. Process-oriented data sources included material used and produced during the computer-based activity; log data on student activities, asynchronous web-based discussions, three different outputs of each group and a self-report questionnaire. The analysis involved two levels. First, all data were verified and students' activity levels were categorized during each script. The second level of the analysis concentrated on how well the groups proceeded through the different steps from the perspective of collaboration process. According to the findings, scripting enhanced collaboration and ensured that all groups were able to complete the task. However, despite the scripts the group activities varied during the task and the script could not guarantee "high-level" participation by all students. The activity level of participants varied between the different scripts both in terms of the number of active participants and the degree of individual participants'

activity in each phase of the script. The results of the study can be utilized in designing collaboration scripts for computer-supported settings.

G 6
30 August 2007 08:30 - 10:30
Room: -1.64
Symposium

The potential cognitive abilities in explaining the early numeracy performance

Chair: **Pirjo Aunio,** University of Jyväskylä, *Finland*
Organiser: **Pirjo Aunio,** Niilo Maki Institute, *Finland*
Organiser: **Johannes E. H. Van Luit,** Utrecht University, *Netherlands*
Discussant: **Diny van der Aalsvoort,** Leiden University, *Netherlands*

Recently there has been a rise in research interests towards early numeracy development and developmental difficulties in it (e.g., Journal of Learning Disabilities vol 38, no.4, July/August 2005) which has been until now a highly neglected topic compared for example the amount of research done in early literacy. One line of the research is trying to find out the best ways to assist children with difficulties in early mathematics learning by seeking more information about the origins of their difficulties. The literature concerning the older children and formal school mathematics suggests that the general intelligence explains only 9-25% of the variance in mathematics performance, and that the potential other explaining factors might be working memory, executive functions and language abilities. The aim of the current symposium is to find out how these cognitive abilities are related to early numeracy, i.e. such mathematical skills which generally develop before the start of the formal teaching of mathematics in school. The four papers are sound empirical research into the topic. Together there will be results from 483 children aged 4 to 7 years from four different non-English speaking countries. The instruments used to measure different aspects of working memory, executive functions, language abilities and IQ are overlapping between the countries providing interesting possibilities also for cross-sample comparisons. Three of the papers apply one-time-measurement design, and one offers the results from a longitudinal design. The scientific and educational relevance of the symposium is clear. Firstly, it offers new knowledge about the origins of early numeracy development and its difficulties. Secondly, it gives valuable information for the use of mathematical screening and diagnostic measurements designed to be used with young children. Thirdly, this symposium will give ideas to what to include in the intervention programs planned to support the children's mathematical development.

The working memory capacity in explaining children's early numeracy
Pirjo Aunio, Niilo Maki Institute, *Finland*
Minna Kyttälä, University of Helsinki, *Finland*

The relationship between early numerical abilities and working memory will be investigated. Theoretical background is based on Baddeley´s (1986, 1997, 2000) conceptualisation of working memory as a four-component information processor. The presentation is based on the research project in which we examined how early numeracy in four- to six-year old Finnish children

(N=116) is related to working memory (WM), namely central executive (CE), visuo-spatial WM (VSWM) and phonological WM. In addition, we analyzed the impact of language abilities to children's early numeracy. The general intelligence was a controlled variable. The data was collected during April and May 2006 and will be analysed in autumn 2006. The purpose of the analysis is to investigate whether the performance in different WM tasks (storing, simultaneous storing and processing, visuo-spatial, verbal) explains early numeracy performance (incl. relational and counting skills). We will also examine how much of the early numeracy skills can be explained by language skills including the possible interactions between e.g. language and working memory. Structural regression modelling will be used. The results are relevant especially for the special education field, which designs the early screening measurements and provides support for children with mathematical difficulties.

The role of executive functioning and inhibition in early mathematics
Jose I. Navarro, University of Cadiz, *Spain*
Manuel Aguilar, University of Cadiz, *Spain*
Concepcion Alcalde, University of Cadiz, *Spain*
Esperanza Marchena, University of Cadiz, *Spain*
Jesus Garcia, University of Cadiz, *Spain*
Gonzalo Ruiz, University of Cadiz, *Spain*

The Utrecht Early Numeracy Test (ENT) assesses young children's number sense. Four subscales refer to the logical principles identified as the key factors underlying children's understanding of quantities and relations, and four subscales focus more explicitly on the use and understanding of numbers. The purpose of this study was to examine the cognitive correlates in the ENT. Inhibitory processes, working memory, and naming speed were evaluated. Inhibitory processes refer to the central, active suppression of information that is irrelevant to the task at hand. The Working Memory (WM) tasks require children to hold increasingly complex information in memory while responding to the questions about a task. Naming Speed refers to rapidly respond on a variety of the most familiar visual symbols and stimuli in the language. A total of 50 children, aged between 4 and 7 from Cadiz (Spain) schools district participated in this study. The mean age of the participants was 5 y.1 m. Intelligence was evaluated by WISC-IV. The naming speed was assessed by The Rapid Automatized Naming Test. A version of the Stroop task yielded measures of effortful inhibition, and susceptibility to interference. Finally, WM was assessed by the Children Working Memory Test. Students were tested in mobile research laboratories on school grounds during their second- or third preschool years or first primary school year. A variance analysis of results and predictor cognitive variables (WM, inhibitory processes and naming speed) for The ENT performer will be analyzed. Hypothesis prediction suggests that the higher scores in the working memory, and the inhibitory processes, rather than naming speed will results in better ENT performing.

Precursors of early mathematics learning
Maria Chiara Passolunghi, University of Trieste, *Italy*

Numerical learning is an essential component in education and deficit in mathematical understanding strongly impair functioning, at school but also in everyday life. Research shows a high incidence of difficulties in mathematics learning in the population; about 7% of school children suffer from a cognitive or neuropsychological deficit that interferes with the acquisition of normal competence in mathematics. This research aims at identifying the precursors of mathematics learning at the beginning of primary school. There are few experimental studies on

this topic and existing ones use between-subjects designs and correlation analysis. This paper analyses longitudinal data to investigate whether the relationship between basic abilities and mathematics learning is causally interpretable, rather than one where cognitive abilities are correlated to early mathematics learning in a cross-section design. The present study tested 170 children at the beginning and the end of first year of primary school. From recent literature, we selected basic cognitive abilities highly likely to predict future mathematics learning. A battery of tests relative to these abilities (working memory resources; phonological ability; numerical competence, i.e. production and understanding of numbers, counting ability), measured pupils' capacities when first starting primary school. We then looked at the relationships between these test scores and a test of mathematics ability at the end of the first school year. Linear structural relations, causally interpreted, were used. The model showed that working memory tasks, that in particular tap executive functions, and counting ability tasks are the most discriminating and efficient as precursors of early mathematics learning. In our data, phonological ability is not involved in mathematics learning ability, and in the presence of the cognitive measures included in the model, intelligence level does not directly influence mathematics capacity.

The role of executive functions in the development of preparatory math
Evelyn H. Kroesbergen, Utrecht University, *Netherlands*
Johannes E. H. Van Luit, Utrecht University, *Netherlands*
Bernadette A. M. Van de Rijt, Utrecht University, *Netherlands*

The aim of this study was to investigate the relations between executive functions and preparatory math skills in normally developing kindergartners. The hypothesis was tested that executive functions explain a large part of the variability in early math skills, more than traditional intelligence does. Early math skills are operationalized in terms of counting skills. Executive functions are defined as the higher-order functions that are necessary for the adequate execution of complex goal-directed activities. Different executive functions were measured: planning, updating, and inhibition. 143 children, aged five to six, participated in the study. Next to the measures of counting skills, executive functions, and intelligence, the language level of the children was measured, because this is an important predictor for the counting skills. The results show that two of the three tests for executive functions show stronger correlations with the counting skills than the intelligence. The test expected to measure inhibition did not correlate with the early math performance. The executive functions planning and updating together explain 41% of the variation in the counting skills, while the intelligence can only account for 21%. The results confirm the hypothesis that the executive functions are more closely related to the early math performance than the intelligence. Although further research is essential, the results are promising. The concept of executive functions should be used for the early identification of children at risk for math learning difficulties and can give direction to the remediation programs.

References for the symposium The potential cognitive abilities in explaining the early numeracy performance
Pirjo Aunio, Niilo Maki Institute, *Finland*
Johannes E. H. Van Luit, Utrecht University, *Netherlands*

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G 7
30 August 2007 08:30 - 10:30
Room: 7.14
Symposium

The use of support devices in learning environments

Chair: **Geraldine Clarebout,** K.U.Leuven, *Belgium*
Organiser: **Geraldine Clarebout,** K.U.Leuven, *Belgium*
Organiser: **Jan Elen,** K.U.Leuven, *Belgium*
Discussant: **Scott Grabinger,** University of Colorado at Denver, *USA*

Learning environments typically contain devices that are included to support learners (Hannafin, Hall, Land & Hill, 1994). These support devices become especially important when learners have to deal with. However, research indicates that students tend to not use the support offered. Or, when they do use it, they often do so inadequately (see Stahl, Schworm, Fischer, & Wallace, 2003; Clarebout & Elen, 2006). Different reasons can underlie this non- or inadequate use (Perkins, 1985). First, the support itself may be poorly designed and hence not be beneficial for students. Second, students' may be unfamiliar with the support, they may not know why and how to use the support devices. Third, the use of the support assumes learners to comply to a learning environment. For a variety of reasons learners may be inclined to be non-compliant. The different papers in this symposium will address factors that may influence the use of support devices. The different papers stress different aspects with respect to this issue: external variables such as training are addressed as well as specific learner characteristics that may influence tool use.

Who benefits from situated prompts in authentic learning environments?
Holger Horz, Unviersity of Koblenz-Landau, *Germany*
Claudia Winter, University of Mannheim, *Germany*
Stefan Fries, University of Mannheim, *Germany*

Learners often neglect support (glossaries, help sites etc.) in computer-based learning environments since they experience it as an unrelated add-on. We assumed that prompts presenting situated strategic and metacognitive support ('situated prompts') lead to an increased support use resulting in a higher cognitive load of learners, which than causes a lower learning performance if learners have a lower thematic expertise. To scrutinize the differential effect of situated prompts we conducted an experiment with 69 students (undergraduates vs. graduates). Students learned either with a learning environment with or without situated prompts. As expected, learning with situated prompts resulted in an increased support usage. Furthermore, two interaction effects occurred. (1) Graduates learned slightly better with a programme including situated prompts compared to a programme without prompts whereas undergraduates performed better without situated prompts. (2) Undergraduates stated a higher perceived cognitive load if they learned with a program with situated prompts compared to undergraduates learning with a program without situated prompts. In the group of graduates no differences occurred concerning the perceived cognitive load. The results are interpreted within the framework of cognitive load theory.

The role of graphical and text-based argumentation tools in hypermedia learning
Joerg Zumbach, University of Salzburg, *Austria*

In this study the effects of visualization tools on argumentation skills, knowledge acquisition, and motivation during hypermedia learning were examined. Participants in this experiment had to complete an argumentation task on environmental issues by using a hypermedia learning environment as resource. In one condition, participants were provided with a graphical concept-mapping tool in order to complete an argumentation task. In a second condition, a simple two-columned word-pad has been given. Results suggest that a graphical argumentation tool can enhance learners' motivation, but has no influence on knowledge acquisition or quality of arguments. Overall, results reveal that the assignment of an argumentation task to hypermedia learning environments was an effective instructional strategy that led to enhanced knowledge acquisition.

Effects of computer assisted metacognitive instruction on learning performance
Maria Bannert, Chemnitz University of Technology, *Germany*
Melanie Hildebrand, Chemnitz University of Technology, *Germany*
Katja Junghanns, Chemnitz University of Technology, *Germany*

Successful learning is mainly based on metacognitive activities which has to be performed and constantly monitored during learning. Research reveals that many learners have difficulties in performing these metacognitive activities spontaneously which most probably results in lower learning outcomes. So, the key issue of the study is to develop effective metacognitive instructions by means of computer support. Based on earlier research a computer assisted training session was developed and evaluated experimentally. With this support device students are explicitly instructed to activate their repertoire of metacognitive knowledge and skills which should further enhance learning and transfer. To test this assumption students of the experimental group (n=29) were instructed in a short computer assisted training session lasting about 30 minutes why metacognitive activities are useful and how to apply them during learning. Students of the control

group (n=27) were not trained why and how to use metacognitive activities, but rather they were instructed by a computer device how to organize an appropriate learning place, which lasted also 30 minutes. After the training sessions the students' learning task was to learn about the "psychological theories of using pictures in multimedia learning environments" within 60 minutes. Immediately afterwards learning outcome and transfer were obtained by questionnaire. Altogether 57 university students were participating, counterbalanced according to their prior knowledge as well as metacognitive knowledge. As expected students of the experimental group showed better transfer performance compared to the control group. However, training did not increase metacognitive and strategic behavior measured by subjective ratings.

Use and usefulness of regulative scaffolds during collaborative scientific inquiry learning
Ard Lazonder, University of Twente, *Netherlands*
Sarah Manlove, University of Twente, *Netherlands*
Ton de Jong, University of Twente, *Netherlands*

This research addresses issues in the design of online scaffolds within collaborative scientific inquiry learning environments. A regulative support tool called the Process Coordinator (PC) was designed to promote increased planning, monitoring and evaluation throughout the course of the inquiry activity. In an empirical evaluation, 20 dyads received a "full" version of the PC with regulative directions, cues, and prompts; dyads in the control group (n=18) worked with an "empty" PC from which all regulative support was removed. Results showed that the regulative scaffolding in the PC neither lead to higher learning outcomes, nor promoted sustained monitoring and evaluating. Implications of these findings are discussed and suggestions for future research

Factors influencing tool use
Geraldine Clarebout, K.U.Leuven, *Belgium*
Jan Elen, K.U.Leuven, *Belgium*

In this contribution tool use in a computer-based learning environment is looked at. Environmental and learner characteristics are investigated as influencing factors of tool use. To study the influence of these factors an experimental design was used. The two treatment groups got access to tools, while the control group did not. To study the influence of external factors, one of these groups additionally, received advice on how to use these tools. With respect to the learner related variables the following variables were considered: metacognition, motivation, help seeking behavior and instructional conceptions were measured.

G 8
30 August 2007 08:30 - 10:30
Room: 4.95
Symposium

Learning with ICT: New perspectives on help seeking and information search

Chair: **Minna Puustinen,** CNRS & University of Poitiers, *France*
Organiser: **Minna Puustinen,** CNRS & University of Poitiers, *France*
Discussant: **Jean-Francois Rouet,** CNRS & University of Poitiers, *France*

Educational researchers have amply documented the beneficial effects of help seeking on learning and understanding, and actively soliciting help from teachers (or other human sources) when faced with a difficult task is now considered a self-regulated learning strategy. In a related domain, information search refers to learner-initiated efforts to obtain further task-related information from books or other non-human sources when undertaking an assignment. The development of educational ICT has offered new perspectives to the research on both help seeking and information search. In fact, effective support – whether human or ICT-based – has proved to be essential to successful technology-based learning. At the same time, however, the definition of help seeking has apparently undergone a change. While information search systematically (i.e., in traditional and in technology-based learning situations) implies non-human support, technology-based help seeking currently refers to both human (e.g., at-distance expert) and non-human (e.g., online help system) type of support. Therefore, the aim of this symposium is twofold: present recent research on technology-based help seeking and information search by bringing together specialists from different domains (i.e., psychology, educational sciences, ergonomics, and learning technologies), and give rise to a debate on the essential nature of technology-based help seeking. We believe that beyond the obvious theoretical importance of the issue, clarifying the boundaries between help seeking and information search will contribute to the development of more effective forms of human and non-human support for technology-based learning environments.

Not everybody needs help to seek help. Surprising effects of metacognitive instructions to foster help seeking in an online learning environment
Elmar Stahl, University of Education, Freiburg, *Germany*
Tobias Bartholome, University of Münster, *Germany*
Rainer Bromme, University of Münster, *Germany*

Offering help functions is a standard feature of computer-based interactive learning environments (ILE). Nevertheless, a number of recent studies indicate that learners are not using such help facilities effectively. We compared the effects of different metacognitive instructions to foster learners' help-seeking behavior in an ILE for plant identification. As a baseline measure, students (n = 51) were asked to determine one plant that was easy to classify with the ILE. Then they were divided into four groups, each receiving a different metacognitive instruction: activation of prior knowledge (n = 13), a strategic instruction (n = 12), a combination of both (n = 12) or no explicit instruction (n = 14). Afterwards they were asked to determine a second, more difficult plant. Students had to think aloud and were video-recorded during the experiment and completed a knowledge test at the end of the session. The surprising effect was that students in all groups were effective help-seekers. They adapted their help-seeking behavior to the complexity of the plants in

an effective way. The results will be discussed in relation to the interaction between the design of ILEs, the learning tasks, and learner factors.

Seeking help via a mobile phone: A solution for apprentices at work?
Jean-Luc Gurtner, University of Fribourg, *Switzerland*
Matthieu Calame, University of Fribourg, *Switzerland*
Diego Corti, University of Fribourg, *Switzerland*

The present paper reports on the first step of a research project in vocational education whose general objective is to foster apprentice autonomy via the use of learning technologies. In fact, learning at work differs in many ways from learning in a traditional school context. For example, apprentices rarely sit at a desk, and more experienced co-workers are expected to assist beginners in the accomplishment of their duties. Within this context, we postulate that the use of light mobile communication devices may alleviate the apprentices' but also the experts' difficulties related to seeking and providing "just-in-time" help at work. The aim of this preliminary study was to evaluate the technical and cognitive feasibility of the project: the apprentices' ability to communicate their problems and needs via a mobile phone, and the experts' capacity to provide the apprentices with assistance without being next to them and actually seeing the problem. Eighteen volunteer apprentices in car mechanics were equipped with cellular phones, headsets, and microphones. Research assistants called them once a week during eight consecutive weeks and asked them to verbalise their thoughts and feelings (e.g., problems encountered) out loud during their work at the garage. An analysis of the apprentices' help requests showed, for example, that only one request out of four would have necessitated the experts to quit their own activity and come and help the apprentice directly. Furthermore, the experts rated the help requests stemming from the last four sessions as easier to understand than those formulated during the first four sessions, indicating that the quality of the apprentices' problem descriptions improved over the sessions. Altogether, the results provided some evidence that light mobile communication devices may indeed offer an enriching and realistic alternative to face-to-face help-seeking interactions for apprentices at work.

From planification to search in computer help systems
Mireille Betrancourt, TECFA-FPSE, University of Geneva, *Switzerland*

Existing literature on help systems reports on major difficulties novice users encounter when trying to learn new software functionalities through the use of an embedded help system. Far to be a simple and univocal task, information search in a help system is most often accomplished as a secondary task during a primary activity that is performed in a dynamic context under specific constraints (e.g. professional situations). We assume that one of the main sources of difficulty for users lies in the formulation of a definite search query from an ill-defined problem encountered in the primary activity. We carried out an experiment to evaluate the users' performance and search strategies with different types of targets. The targets were defined as either simple or complex according to the familiarity of their denomination, and they could be reached in either 3 or 4 steps in the help system arborescence. In order to be as close as possible to an ecological text formatting task, the users were asked to reproduce a formatted text in which four elements were to be searched in the help system. The results showed that the familiarity of the target denomination affected dramatically the searching performance, but that the depth of its position in the help system arborescence had little effect on it. We conclude in deriving some guidelines for the design of help systems that would effectively support learning.

Seeking and providing help in technology-based learning-by-doing situations
Lisa-Marie Babin, France Telecom R&D, *France*
Andre Tricot, CNRS & University of Toulouse, *France*
Claudette Marine, CNRS & University of Toulouse, *France*
Gerard Poulain, France Telecom R&D, *France*

Throughout their life, people are faced with learning situations, in particular when they need to learn how to use new software, services, or information systems. However, learners needing assistance do not systematically seek or use help, even when it is available (Aleven et al., 2003). Thus, the aims of the present study were as follows: (1) identify the users' need of assistance during a learning-by-doing task, in order to provide them with help when they come to a deadlock, (2) compare the nature of the provided help according to the users' level of expertise, and (3) compare different helping scenarios (i.e., help is provided after a user's request versus after a deadlock detected by the system). Firstly, the Tower of Hanoi task was used to characterize the sequences of actions corresponding to deadlocks, the nature of the assistance, and the moment for proposing assistance. Next, we designed help systems allowing users to learn how to use new multimedia applications. The results showed that (1) even when participants had reached an impasse, most of them never sought assistance, (2) procedural type of help that was automatically provided by the system (i.e., not requested by the users) was effective for novice users, and (3) non-procedural assistance that was automatically provided by the system was effective for expert users. During the next phase of the study, our goal will be to analyze whether the lack of spontaneous help seeking is due to a lack of awareness concerning the impasse or to a refusal (temporary or not) of assistance. The effect of "alarms" (i.e., the detection of an impasse by the system) on the users' awareness concerning the deadlocks as well as on the users' requests for help will be studied as a function of their expertise.

Non effective computer-mediated help seeking: Implications for the design of help systems
Minna Puustinen, CNRS & University of Poitiers, *France*
Josie Bernicot, CNRS & University of Poitiers, *France*

Successful learning with educational ICT necessitates effective help systems. Our aim was to contribute to that issue, by analysing non effective computer-mediated interactions between learners and teachers. We used the archives of a French forum providing students with individualised help in mathematics. Students may go to the forum whenever they feel it is necessary and type their messages online or else send their messages via email. Voluntary secondary school mathematics teachers answer the students' messages seven days per week. Our data consisted of cases (N=160) in which the students (mainly upper secondary school students), who had already formulated a request and received a teacher's initial answer, returned to the forum. We considered that in those cases, the initial help-seeking interaction had not been effective enough in terms of the learning outcomes. The analyses showed, for example, that the students who returned to the forum typically did so either to formulate another request concerning the same piece of homework or to provide the teachers with supplementary information they needed to be able to answer the students' questions properly. In fact, the teachers were not always able to answer the students' messages due to lacking or insufficient information concerning the students' exercises or identity, for example. Finally, we conducted a more detailed qualitative analysis of the cases in which the students returned to the forum in order to formulate another request concerning the same piece of homework. The implications of our findings for the design of help systems will be discussed in the light of previous research on student help seeking.

G 9
30 August 2007 08:30 - 10:30
Room: 0.100A
Symposium

Becoming -being an academic: Experiencing and negotiating the inherent tensions of academia

Chair: **Lynn McAlpine,** McGill University, *Canada*
Organiser: **Lynn McAlpine,** McGill University, *Canada*
Discussant: **Sari Lindblom-Ylänne,** University of Helsinki, *Finland*

Universities today can be characterized as much by the internal and external pressures for change as by the traditions upon which they rest. This situation may produce tensions that are felt at all levels of the university structure (Central Administration, Faculties, Departments, Programs etc.) as well as within the scholarly disciplines represented in the university. Many new and seasoned academics, given this shifting terrain, may be struggling to understand how they can best build their own sense of worth and efficacy as it relates to their disciplines and the university itself. At the same time, doctoral students, with support of their academic supervisors, their peers and on their own, seek to develop their own understanding of the academy as they move toward completion of their studies and, in the case of those wishing to become academics, develop their identities and situate themselves in their scholarly communities. Some of the questions we address in this session are: How do doctoral students/ academics experience the tensions between academic structures and pressures and their own personal goals and intentions in relation to community? How do doctoral students/ academics negotiate and/or challenge the affiliations, allegiances and diversities that characterize academic life while at the same time becoming and continuing to be productive and fulfilled scholars? Our four papers bring different perspectives to bear on these questions.

Tensions affecting the experience of research and being a researcher: Implications for doctoral education
Gerlese Akerlind, Australian National University, *Australia*

A key part of doctoral experience involves coming to think of oneself as a researcher, and developing a sense of what being a researcher means. This paper reports on a qualitative study of different views of what being a university researcher means, based on semi-structured interviews with research students and academic staff at a research-intensive university in Australia. Four different views of the nature of being a researcher emerged: 1. fulfilling external requirements; 2. creating a sense of personal achievement; 3. extending one's personal understanding of an issue/area; and 4. providing an impetus for change to benefit the larger field or society. These ways of experiencing being a researcher were structurally related in a nested hierarchy of inclusiveness, where each new way of experiencing included aspects of the previous way(s), but not vice versa. Given the hierarchical nature of the relationships, it may be tempting to regard these ways of experiencing as representing a developmental sequence, from novice to expert views. In contrast, both junior and senior researchers expressed views ranging across the spectrum. This may be explained as each way of understanding being co-constituted by (1) individuals' prior experience of research and researchers (where ways of experiencing and ways of understanding are seen as inextricably linked) and (2) contextual factors currently impacting upon the research

and researcher, which can act to focus researchers' attention on certain aspects of research and being a researcher, sometimes to the exclusion of other aspects. For instance, for doctoral students and their supervisors, tensions associated with increasing pressures for timely completions (especially in Australia and the UK) can compete with other pressures to establish oneself as a scholar in the field, or to have one's research agenda primarily driven by curiosity or a desire to make a difference to a larger field or society.

Academic communities and developing identity: The doctoral student journey
Lynn McAlpine, McGill University, *Canada*
Cheryl Amundsen, Simon Fraser University, *Canada*
Anthony Pare, McGill University, *Canada*
Doreen Starke-Meyerring, McGill University, *Canada*

Doctoral programs often experience high attrition rates, particularly in the social sciences and humanities. When we began our present program of research, aspects of which we report here, our goal was to analyze the experience of doctoral students in Education and English in order to understand how they learned from engaging in the range of activities, both formal and informal, available to them in their programs. As we analyzed data from initial studies carried out in different contexts, a clear theme emerged and now underpins our emerging understanding of the doctoral experience: the development of academic identity within the shifting tensions of the discipline and the institution. For doctoral students, an important aspect of developing identity and autonomy during the PhD is looking to one's chosen academic community for recognition, and learning how to reconcile potential conflicts between individual and collective values. We report here the integration of three studies examining the experience of doctoral students in Education and English, each providing a different lens on the question of academic identity. The first study examined the efforts of a committee of Education doctoral students to create a more collegial scholarly environment for students in their Faculty; the second examined similarities and differences in student and professor perspectives on the changing expectations of the PhD in English; the third examined the actual conversations of Education students and supervisors as they reviewed writing related to the student's dissertation. A clear thread that unites these studies is the development of student voice in a complex environment, a thread that is intertwined with their intentional engagement, individually and collectively, in a broad range of activities in which they experienced pleasures, challenges and tensions. While the studies took place in a Canadian research-intensive university, we believe they are broadly relevant to any research-intensive institution.

Developing research identities: Feminist researchers and the challenge to orthodoxies
Gina Wisker, University of Brighton, *United Kingdom*

For postgraduate students and their supervisors, research is never value free in mode, method or expression. Indeed, it can be argued that for the kind of conceptual levels of work, critical engagement and contribution to knowledge and meaning expected for PhD in particular, but also much master's dissertation work, challenge to orthodoxies is a necessity, though not always enacted in practice. The problematising and expressing of established ways of looking at the world necessarily demands risk taking, discomfort, challenge and eventually new modes of expression of new ideas. In this respect, researchers who identify as feminist might well represent a special case. In the literature, in experience, and latterly through the research upon which this paper is based, feminist researchers are frequently called to develop their identities as researchers through challenging or adapting established research orthodoxies in terms of subject matter and research

questions, methodology and methods, stance regarding the research population, and contribution to knowledge and meaning. This paper reports on research conducted with a small number of PhD and MA women's studies students from 2004-6. It links developing theories of threshold concepts (Meyer & Land, 2003) with those concerning feminist research (Wisker, 2005; Leonard, 2001), where the involvement in feminist research is seen as the threshold concept, particularly in relation to its vision, approaches and strategies. It leads to a consideration of how in challenging research orthodoxies 'becoming' feminist researchers develop both voice and identity.

Studying doctoral education: Using Activity Theory as a methodological tool
Cathy Beauchamp, Bishop's University, *Canada*
Lynn McAlpine, McGill University, *Canada*
Marian Jazvac-Martek, McGill University, *Canada*

In the progress toward their goal of completing a Ph.D. and establishing an academic identity, doctoral candidates participate in multiple contexts. Our project has focused on the study of these contexts, or activity systems, with a view to understanding the dynamics and tensions of the doctoral experience in education. To do so, we have used Activity Theory (AT) as a methodological tool in the construction of protocols for investigating the nature of doctoral candidates' participation in a variety of activities, in keeping with the idea that AT may be valuable as an analytical lens for studying and modifying practice (Daniels, 2004). We report here on the methodology used to develop one such protocol using key concepts of AT as a basis for formulating questions for doctoral candidates. Our preliminary findings (e.g., range of interactions across the academic community and beyond that influence 'feeling like an academic') indicate that AT can be a powerful analytic tool for accessing the complex interactions in which doctoral candidates engage and for developing a richer understanding of their development of identity within the dynamics of the academy. Furthermore, the results suggest that AT may have a broader value in the study of educational contexts in general.

G 10
30 August 2007 08:30 - 10:30
Room: 0.99
Symposium

Development and determinants of reading literacy and language skills in immigrant students

Chair: **Andrea G. Müller,** Max Planck Institute for Human Development, *Germany*
Organiser: **Andrea G. Müller,** Max Planck Institute for Human Development, *Germany*
Organiser: **Nele McElvany,** Max Planck Institute for Human Development, *Germany*
Discussant: **Petra Stanat,** Friedrich-Alexander-University Erlangen-Nuremberg, *Germany*

International student assessments have shown that immigrant students are systematically outperformed by non-immigrant students in most western countries (OECD, 2001, 2004; Stanat & Christensen, 2006). Language skills and reading literacy are important conditions for educational success. This symposium brings together international researchers to investigate – in depth and drawing on several sets of longitudinal data – the levels and development of reading literacy and language skills in immigrant children. Nonie K. Lesaux (Harvard School of Education, USA) will

present findings from a Canadian longitudinal study comparing the development of reading in a group of English language learners and their native English-speaking peers, from kindergarten through fourth grade. Also focusing on reading development, Nele McElvany (Max Planck Institute for Human Development, Germany) will present findings from a longitudinal study (grades 3-6) on the development of text comprehension and examine different predictors of the achievement of immigrant and non-immigrant elementary school children in Germany. Taking a closer look at language determinants, Andrea G. Müller (Max Planck Institute for Human Development, Germany) will report a study investigating the effects of difficult vocabulary and complex grammar on listening comprehension. Drawing on a sample of older students approaching the end of compulsory schooling, Catherine Rothon (University of London, Great Britain) will examine the impact of social class, language and psychological distress on the educational achievement of minority ethnic adolescents in East London, highlighting a possible explanatory mechanism for observed differences in achievement by gender. Focusing on the family environment, Paul Leseman (Utrecht University, The Netherlands) will identify family factors that can help to explain subtractive bilingualism, reporting findings from a longitudinal study into informal preparation for school in low-income Dutch and immigrant families in the Netherlands. The scientific and educational relevance of the findings will be discussed by Petra Stanat (University Erlangen-Nuremberg, Germany).

Growth in reading skills of children from diverse linguistic backgrounds: Findings from a 5-year longitudinal study
Nonie K. Lesaux, Harvard Graduate School of Education, *USA*
Andre A. Rupp, Humboldt-University Berlin, *Germany*
Linda S. Siegel, University of British Columbia, *Canada*

A longitudinal investigation was conducted in order to investigate the reading development of a sample of 824 English language learners (ELLs) and native English-speaking (L1) children. In kindergarten and fourth grade, children's word reading, spelling, phonological processing, syntactic awareness, and working memory skills were assessed with standardized and experimental measures. In addition, word reading was assessed from kindergarten through fourth grade, and reading comprehension was assessed in fourth grade. Comparisons of component skills of reading and reading outcomes between the ELLs and the L1 speakers demonstrated that despite slightly lower performance of the ELLs on several kindergarten tasks, the differences between the two groups at fourth grade were negligible. Furthermore, fourth grade word reading and reading comprehension was predicted by the same kindergarten tasks for both language groups. Finally, the trajectory of word reading was non-linear for both groups, although predictors of this trajectory differed between them. The implications for our understanding of the development of reading for ELLs will be discussed.

Development and determinants of reading literacy in bilingual children
Nele McElvany, Max Planck Institute for Human Development, *Germany*
Michael Becker, Max Planck Institute for Human Development, *Germany*
Gabriel Nagy, Max Planck Institute for Human Development, *Germany*

International educational assessments show that immigrant students are systematically outperformed by nonimmigrant students in most western countries (OECD, 2001, 2004; Stanat & Christensen, 2006). Reading literacy is one of the core skills acquired in school and a key prerequisite for successful learning. However, longitudinal findings on how reading literacy develops in immigrant children are scarce outside English-speaking education systems (Garcia,

2000). The present study investigates whether and how the development of text comprehension and central prerequisites of reading literacy (vocabulary, decoding skills, metacognition, and reading motivation) differs between bilingual and monolingual children in Germany. It further examines whether the individual prerequisites have differential effects on the development of reading literacy in the two groups. The longitudinal study followed the development of 700 elementary students from the end of grade 3 (June 2003) to grade 6 (May 2006). Students' immigration status was defined in terms of the language spoken at home. Latent growth curve models were specified, and preliminary results of chi-squared difference tests between models specifying the same vs. different initial and change scores for the two student groups indicate that the groups differed in their initial levels of text comprehension, vocabulary, and decoding speed, with substantial effect sizes favoring the nonimmigrant group, and that they subsequently developed parallel to each other. Analyses of the potentially differential influences of vocabulary, decoding speed, and motivation provide further insights into the development of reading literacy in bilingual children. The study has important theoretical and practical implications. The results indicate that German schools currently do not succeed in redressing immigrant students' considerable deficits in reading literacy and its prerequisites. Findings will contribute to the development of valid models of reading literacy in bilingual children.

Lexical and syntactical aspects as barriers to proficiency in school-related language among second language learners

Andrea G. Müller, Max Planck Institute for Human Development, *Germany*

The differentiation between everyday and school-related language proficiency is seen as central to understanding the attainment differences observed between immigrant and non-immigrant students. For example, Cummins (1979, 1981, 2000) differentiates between the linguistic demands of everyday conversation skills and academic language proficiency, and Gogolin (2003) argues that the language used at school becomes increasingly complex. It is assumed that it is more difficult to reach proficiency in school-related language than it is to become competent in everyday communication skills. Empirical evidence for the validity of this differentiation remains scarce, however. Specifically, little is known about aspects of language that might contribute to the lower performance of second language learners in situations where proficiency in school-related language is required. Drawing on this framework, we investigated the language proficiency of primary school children in Germany. First, immigrant and non-immigrant students' written language production skills on tasks with everyday and school-related content were examined and compared. Findings indicate performance differences between tasks with everyday and school-related content. More importantly, the performance gap between immigrant and non-immigrant students was more pronounced on tasks with school-related content than on tasks with everyday content. Second, we analysed linguistic factors potentially contributing to lower proficiency in school-related language. Specifically, we investigated the influence of lexical and syntactical aspects of language on listening comprehension. Immigrant students were expected to be at an additional disadvantage to non-immigrant students in listening comprehension texts with difficult vocabulary and/or complex grammar relative to texts with easy vocabulary and/or simple grammar. However, no such difference was found. In sum, findings indicate an additional disadvantage for second language learners only when written language production tasks cover school-related content. It is therefore argued that improving school-related language proficiency, especially in writing, is crucial for immigrant students' educational success.

The impact of social class, language use and psychological distress on the educational achievements of minority ethnic adolescents in a deprived area of london
Catherine Rothon, University of London, *United Kingdom*

This study examines the impact of social class, language and psychological distress on the educational achievement of minority ethnic adolescents in East London. It focuses on achievement at the General Certificate of Secondary Education Examinations (GCSEs), taken at age 16. These mark the end of compulsory education in Britain. Preliminary analysis suggests that there are marked differences in performance by ethnicity before controlling for confounding factors. Asian Indian boys and girls perform particularly well whilst black Caribbean, black African, black British and Pakistani males achieve lower results. In all ethnic groups females outperform males. For many of these poorly performing groups, social class is unable to account for the differences observed. Language spoken at home forms a larger part of the explanation for the differentials. The overall score for psychological distress had a greater magnitude and significance for boys. Much of the difference could be explained by the types of distress experienced; girls more commonly suffered from emotional symptoms, whilst boys were more likely to exhibit conduct problems. When the overall measure was broken down into its constituent parts it was found that conduct problems had the strongest relationship with achievement; the effect for emotional symptoms was non-significant. Psychological distress was particularly important in explaining the relatively low performance of black African boys. This finding highlights a possible explanatory mechanism for observed differences in achievement at GCSE by gender, a phenomenon that empirical research has often struggled to find an answer for.

Preparation for school learning in low-income and minority families
Paul P.M. Leseman, Utrecht University, *Netherlands*
Anna F. Scheele, Utrecht University, *Netherlands*
Aziza Y. Mayo, Utrecht University, *Netherlands*

The paper reports findings of a longitudinal study into informal preparation for school in low-income Dutch and Turkish and Moroccan immigrant families in the Netherlands. Although no differences in nonverbal cognitive skills (intelligence, working memory) were found between Dutch and immigrant children at age three, indicating equally distributed learning potential, profound disadvantages for immigrant children appeared on a whole range of language skills in both first (Turkish, Tarifit-Berber) and second language (Dutch). Moreover, these disadvantages appeared to be rather stable over time and even to increase. Using structural equation modelling, factors in the home environment, covering broad dimensions of informal language, pre-literacy and pre-math instruction, were found to explain most of the variance in language testscores, in addition to individual cognitive abilities. The results indicate a situation of subtractive bilingualism in the immigrant families studied here. The paper will try to identify factors that can explain the situation of subtractive bilingualism, which include mothers' social isolation, child rearing stress, lack of printed materials in the first language, and use of television and electronic games.

G 11
30 August 2007 08:30 - 10:30
Room: 0.89 Jedlik
Symposium

Learning across sites; new tools, infrastructures and practices

Chair: **Sten Ludvigsen,** InterMedia, University of Oslo, *Norway*
Organiser: **Sten Ludvigsen,** InterMedia, University of Oslo, *Norway*
Organiser: **Andreas Lund,** InterMedia, University of Oslo, *Norway*
Discussant: **Roger Säljö,** Dep. of Education, University of Gothenburg, *Sweden*

Aims: The aim of this symposium is to further advance our understanding of how learning takes place in specific situations and under certain institutional conditions, but also how these two aspects relate to each other. We will "unpack" the idea of collaboration and show how collaboration connects actors in and across settings, through tools and networks. The different presentations will give insights as to how learning is constituted in both schools and workplaces. This gives possibilities to compare and contrast different learning practices and under which conditions they become productive at the individual and collective level. Scientific relevance: Learning and development of knowledge increasingly take place in networks and across multiple and diverse settings and contexts, both within the educational sector and in workplaces. In each sector and sub-sector the development of knowledge is specialized, based on domains and particular divisions of labor. This specialized knowledge is bounded by language and tools in the local settings. The consequence is that expertise and knowledge appears as in-depth specialization attached to local contexts. However, such specialization creates challenges for reuse and for knowledge integration when problems in society, in institutions, and for individual actors demand solutions that go beyond the local context. This means that we need to improve our understanding of learning when problems are complex and go beyond the school curriculum or given work practices. Educational relevance: The implication for education is not given. We know from transfer research that knowledge does not travel easily between different settings like schools and workplaces. By including studies of how learning practice is constituted both in schools and in workplaces as well as designed efforts to change the practices we can develop deeper insights into how learning takes place in and across sites within new infrastructures and with digital tools.

The mediation of collaborative learning relationships in higher education
Charles Crook, University of Nottingham, *United Kingdom*

I argue that research on the computer mediation of collaborative learning has become rather narrowly focussed. In particular, there has been a narrow interest in two distinct scenarios for CSCL: the face-to-face interaction at a computer resource and the asynchronous text-based interaction conducted through computers. These two research lines do not necessarily speak to how CSCL contributes to the potential strengths of campus-based university education. Moreover, confronted with a growth in virtual/distance alternatives, the traditional campus now needs to be quite clear about what those strengths are and how to cultivate them. Evidence from diaries, interviews and VLE system logs is reviewed. Together it suggests that computer supported collaborative learning continues to play only a minor role in the undergraduate's experience of higher education. It is argued in this paper that prevailing research traditions that address technology and collaborative learning need to be extended. It is stressed in this paper that solving problems with others is an arrangement that can be driven by emotion as well as cognition But

joint activity also generates emotion. Research must confront the realities that orchestrated collaborative learning is not always adequately motivated in this sense and, moreover, its conduct may not always generate the affect that makes it attractive to learners. In particular, I illustrate here how it is possible to mobilise technology so as to coordinate for learners a stronger and pervasive sense of progressive knowledge building. At the moment, higher education rarely does this. However, the direction of movement illustrated is one that admits and respects the complementary attractions of solitary thinking - while seeking ways to creatively blend such reflective occasions with group work. In short, universities need to evolve a better understanding of the collaborative experience of learning and thereby exploit the affect that successful social coordination can inspire.

Cultivating collective expertise within Innovative Knowledge Networks (IKPNs)
Kai Hakkarainen, University of Helsinki, *Finland*
Jiri Lallimo, University of Helsinki, *Finland*
Seppo Toikka, University of Helsinki, *Finland*

The purpose of the present article is to examine the role of collective knowledge networks in innovation and knowledge creation. It is argued that human expertise is a socially distributed and self-organized process coevolving with heterogeneous networks of artifacts and human actors. Just as the intelligence of a networked computer cannot be located inside of its processing unit, creative human expertise cannot be found from inside of the human head; human expertise is collective in nature being distributed across a network of cultural-historically developed tools and other artifacts, closely collaborating communities, and heterogeneous networks of people and artifacts. We argue that innovation and knowledge creation within advanced knowledge society takes place in Innovative Knowledge-Practice Networks (IKPNs) that are deliberate created for eliciting the development of collective expertise, deal with increasingly complex and indeterminate objects, cope with dynamically growing requirements of task environments, and inter-link expertise and collective efforts across blurring organizational and institutional boundaries. We examine the role of (socio-culturally-mediated) personal cognitive adaptation and the growth of agency taking place in IKPNs that has, thus far, not been sufficiently addressed or elaborated. Three case studies for examining IKPNs will be provided; the first addresses hybrid expertise within a telecommunication company, the second examines the role of artifacts and documentation in a distributed product development process, and the third cultivation of publication culture within a scientific research community. In the final section challenges and constraints of collective expertise and IKPN are discussed from various perspectives.

Multiplicity and intersecting trajectories of participation; temporality and learning
Sten Ludvigsen, InterMedia, University of Oslo, *Norway*
Ingvill Rasmussen, InterMedia, University of Oslo, *Norway*
Ingeborg Krange, InterMedia, University of Oslo, *Norway*
Anne Moen, InterMedia, University of Oslo, *Norway*
David Middleton, Loughborough University, *United Kingdom*

Time and temporal-spatial relations are key issues in learning. When communicating past experiences and in planning future events, we create events where learning can occur. These relations are also central in tool use and our organisation of activities according to time and space. However, such relations are often overlooked and not theorised adequately within learning research. Our aim is to examine how time is used and what aspects of time are made relevant when participants constitute the objects of learning. In any setting there are meeting points, or zones,

where participants create common objects. In these zones different temporalities intersect. Considering this, it is of particular interest to study the ways in which such objects mediate the learning process. This paper discusses the concept of time in learning with particular reference to its potential for understanding learning in and through intersecting trajectories of participation (Dreier, 1999; Dreier, 1997; Ludvigsen, 1998). We will use empirical data to illustrate what we can achieve analytically when using multiplicity of timescales and intersecting trajectories of participation as central concepts in the study of learning. The temporal-spatial aspects of trajectories of participation are generally overlooked within cognitive theories of learning. However they are accounted for in a variety of ways within socio-cultural perspectives on cognition and learning. In ethnomethodological informed studies or situated activity systems time is both constitutive of, and constituted within, participation in organised settings (Rawls, 2005; Goodwin, 2002). In cultural historical activity theory (CHAT) temporality is conceptualised in relation to the development of institutional activities. Different timescales are accounted for in episodes, phases and trajectories of lifecycles of specific production projects (Saari, 2003; Toiviainen, 2003). Temporality is also connected to the use of artifacts or specific tools in learning environments (Goodwin, 2002; Krange, submitted; Moen, 2006).

Breakdowns between teachers, educators and designers in elaborating new technologiesas precursors of change in education to dialogic thinking
Baruch Schwarz, The Hebrew University, *Israel*
Reuma de Groot, The Hebrew University, *Israel*

Many tools and activities have been developed for enhancing strategies leading to learning processes in classrooms: for example problem-solving strategies such as inquiry based, or case-based strategies. In the research design process, researchers, designers, educators, and teachers are generally actively involved. It is well accepted that not only the tools are refined in a cyclic way, but the very theories on which the primary design is based. The design of appropriate tools is a very demanding task, since designers generally rely on observations in school of users to refine the technologies and to test them. Developing technologies for fostering dialogic thinking and argumentation seems a more straightforward process: The practices involved in the elicitation of argumentation are already well known by teachers as well as students since argumentation is embedded in informal settings (disputes, informal conversations, etc.). Since teachers 'know how to argue', and also 'know the domain they teach', technologies seem to have the potential to facilitate practices to which participants are familiar in other settings. We will see in this paper that the familiarity people have about argumentation and its elicitation raises challenges in the design cycle. Knowledge about argumentative practices is implicit in teachers and students, and its externalization mediated by tools for facilitating it stresses ideological beliefs concerning how teachers should function in school talk. The design process is then far from being smooth but rather leads to breakdowns among teachers, educators, designers, and researchers since beliefs underlying school talk often conflict with dialogic principles. These participants in the design cycle not only have to learn how to use new tools designed for them, but the design of the tools is part of a social process in which their organization, beliefs and identities are at stake.

Changing objects in knowledge creating practices
Andreas Lund, InterMedia, University of Oslo, *Norway*
Trond Eiliv Hauge, InterMedia, University of Oslo, *Norway*

In this paper we ask – and examine – how the object(s) of specific learning activities qualify collective knowledge creation practices (Hakkarainen, Palonen, Paavola, & Lehtinen, 2004). Such

practices are organized around shared objects, which often emerge in the process itself, through negotiation or disturbance. Shared objects can be material, procedural or conceptual. (ibid:141). For pedagogical practice it is important to be aware of the many aspects of the object in order to be able to identify knowledge creation. In knowledge creation practices such objects guide our efforts towards collectively developing a shared representation of a new phenomenon, what we do not yet know. From various positions such issues have been addressed in education as well as in working life (Cope & Kalantzis, 2000; Gee, Hull, & Lankshear, 1996; Wells & Claxton, 2002). We present a case of knowledge creation in which a group of learners (age 17) struggle to make sense of a tragic incident (Sep 2004); the hostage situation and ensuing battle between Chechen rebels and Russian soldiers at School No 1 in Beslan where 344 people, 186 school children among them, died. The object of their collective efforts is partly material in the form of different representations of the group's insights. These material instances are intended to serve as learning objects for classmates. Partly, the object is immaterial and ideational in the sense that it emerges as a collective focus or conceptualization for the group's activities. In both cases we see a process of a group coming-to-know (Wells, 2002).

G 12
30 August 2007 08:30 - 10:30
Room: 0.83 Eötvös
Symposium

Cognitive neuroscience meets education

Chair: **Elsbeth Stern,** ETH Zurich, *Switzerland*
Chair: **Daniel Ansari,** University Western Ontario, *Canada*
Organiser: **Elsbeth Stern,** ETH Zurich, *Switzerland*
Discussant: **Elsbeth Stern,** ETH Zurich, *Switzerland*

Scientific progress in the field of neuroscience as well as the enormous public interest in its findings has raised an ongoing debate about the potential of neuroscience to inform educational reform. Undoubtedly, appropriate brain functioning is the prerequisite for successful schooling. Therefore, addressing questions concerning the interaction between instruction, knowledge acquisition, and brain functioning is a worthwhile goal of future research. However, it has become a matter of concern for many educational researchers that practitioners and policy-makers responsible for educational reforms increasingly ground their decisions on a pseudo-scientific background of brain functioning rather than on the large body of sound research on classroom functioning. It has become dangerously fashionable to label very general and mostly trivial pedagogical advice as "brain-based learning", while the more precise and applicable knowledge from traditional research about how to design powerful learning environments is ignored. Nonetheless, while unrealistic expectations concerning the educational implications of neuroscience have to be scaled down, an interdisciplinary discourse between educational research and cognitive neuroscience may contribute to a better understanding of schooling. The symposium will deal with this question. In the first talk, some fundamental remarks on appropriate scientific argumentation will be made referring to a theory of science. Addressing selected topics of learning research, it will be discussed whether referring to neuroscience will or will not strengthen their theoretical background. The two subsequent talks will deal with the neural bases of quantification and the implications for understanding the difficulties encountered in learning mathematics. The

fourth talk will address the question of how psychometric intelligence affects brain functioning during knowledge processing. The discussant will give an outlook on further research questions that require interdisciplinary collaboration.

Finding the right level of explanation: The educational implications of neuroscience
Ralph Schumacher, Humboldt University, *Germany*

The desire for founding educational reform on a sound empirical basis has coincided with a period of impressive progress in the field of neuroscience and wide public interest in its findings, leading to an ongoing debate about the potential of neuroscience to inform education reform. But is neuroscience really suited to provide specific instructions for improving learning conditions at school? Or is it too underdetermined with regard to psychological and pedagogical explanations to offer such advice? This paper explores the educational implications of neuroscience from the perspective of theory of science. The first part of this paper emphasizes the distinctness and autonomy of psychological, pedagogical and neuroscientific explanations and argues that the relationship between these levels of explanation is best captured by the recent 'supervenience' model of the mind. Accordingly, although mental states are always realized by brain states, psychological and pedagogical concepts cannot be reduced to neuroscientific concepts. The second part illustrates the significance of neuroscience for psychological and pedagogical research on learning and instruction by developmental cognitive and learning deficits like, e.g. dyslexia. Hence, neuroscientific research on those deficits is of psychological and pedagogical importance because it reveals differences that are not observable at the behavioural level. The third part concentrates on the difference between biologically determined learning processes and learning at school. Since in the case of learning at school it is not biologically determined which factors initiate learning processes, and how these learning processes are executed, the description of the preconditions of this type of learning has to go beyond descriptions of preconditions to be met by the human brain. In particular, preconditions of this kind of learning are primarily knowledge preconditions. Since we need psychological concepts to describe them, neuroscience is in principle underdetermined with regard to learning conditions at school.

Behavioural and brain mechanisms underlying children's understanding of numerical magnitude: implications for education
Daniel Ansari, University of Western Ontario, *Canada*

Which is bigger 1 or 9? To answer this question one must have an understanding of the quantities associated with numerical symbols and the numerical relationship between them. This understanding represents a fundamental building block of children's mathematical development. It has been repeatedly shown that when adults and children compare which of two numbers is larger, they are faster when the numbers are numerically far apart (e.g. 1 vs. 9) compared to those close together (e.g. 1 vs. 2). This so-called "numerical distance effect" (NDE) is thought to reflect an underlying mental number line on which numbers that are close together share more representational features than those far apart. In this talk, behavioral and brain-imaging data will be presented which employ the NDE as a paradigm to explore a.) How children develop an understanding of numerical quantity b.) How these changes are related to individual differences in mathematical competence and c.) What underlying changes in brain activation are associated with children's developing understanding of numerical quantity. Specifically, data will be presented which demonstrate that the NDE undergoes significant developmental changes and, moreover, that individual differences in the size of children's NDE are significantly related to performance on standardized tests of mathematics but not reading ability. These behavioral finding do not only

suggest that the NDE changes significantly over developmental time, but that individual differences in basic processing of numerical quantity map on to variability in children's educationally-relevant mathematical skills. Data from brain-imaging data will be presented to illustrate how these functionally important developmental changes in numerical magnitude processing are associated with changes in patterns of neural activations. The discussion of these findings will focus on the relevance of studying basic number processing using behavioral and brain-imaging for early mathematics education as well as the diagnosis and remediation of mathematical difficulties.

Focusing on different aspects of number: evidence from behavior and brain imaging
Minna Hannula, University of Turku, *Finland*
Daniel Ansari, Univresity of Western Ontario, *Canada*
Bruce McCandliss, Cornell University, *USA*

In this presentation, two lines of recent research on number development and basic processing of numbers will be reviewed and described as they were brought together in our research project combining both educational and neuroimaging research. Our aim is to better understand the development of both attentional and cognitive processes involved in number processing and take the first steps towards analyzing individual differences in these processes both at the level of brain activations and the level of behavioral measures of numerical and attentional skills. The current study of groups of adults and children in the age range from 7 to 12 years is based on the triple-code model of Dehaene & Cohen (1995) postulating the existence of different brain regions related to each of the three codes of number, and how focusing on different aspects of numbers is related to differences in brain activation patterns. According to previous studies, the functional neuroanatomy underlining the processing of symbolic numerical magnitude relations undergoes an ontogenetic shift towards greater parietal engagement. We are hopeful that this form of research, which bridges educational insights into children's conceptual development in number processing with brain imaging insights into changes in brain activation patterns, can be useful in opening up news ways of relating theories of instruction of mathematical skills to constructs of attention and number processing in children. Our focus on how number processing is impacted by attending to different aspects of number is an example of construct that might make useful contact between educationally relevant issues in mathematics instruction and issues at the forefront of brain imaging research, potentially providing a rich exchange between these two areas of inquiry.

What brain imaging tells us about the interplay of intelligence and expertise
Roland Grabner, university of graz, *Austria*
Aljoscha Neubauer, University of graz, *Austria*

Individual differences in cognitive performance can be viewed from an intelligence perspective, emphasising general properties of the human information processing system, and from an expertise perspective, highlighting the indispensable role of elaborated domain-specific knowledge and acquired skills. Two studies in different expertise domains are presented that aimed at elucidating the impacts of intelligence and expertise on cognitive performance and the accompanying brain activation. In Study I, an experiment with 31 professional taxi drivers, we measured EEG activity during the performance of a familiar task (thinking about routes to take in their city) and a novel task (memorising routes of an artificial map). In comparing taxi drivers with lower and higher intelligence, an effect of intelligence on performance and cortical activation was only found in the novel task, suggesting that long-term experience can compensate for lower intellectual ability even at the level of brain functioning. In Study II, 47 tournament chess players

of varying intelligence and expertise level worked on tasks drawing on mental speed, memory, and reasoning. Independent effects of expertise and intelligence emerged at both, the performance and the neurophysiological level. Brighter participants performed better than less intelligent ones which was associated with more efficient brain functioning across all tasks. Additionally, a high expertise level was beneficial for good task performance but exerted a topographically differentiated influence on the cortical activation patterns. Both studies indicate that efficient brain functioning is not only a function of intelligence but also of acquired domain-specific competences and demonstrate how the application of brain imaging techniques can further our understanding of the interplay of intelligence and expertise.

G 13
30 August 2007 08:30 - 10:30
Room: Harmónia
Symposium

Assessing teaching approaches in higher education: the influence of personal and contextual factors

Chair: **Peter Van Petegem,** University of Antwerp, *Belgium*
Organiser: **Vincent Donche,** University of Antwerp, *Belgium*
Discussant: **Angela Suk Ping Ho,** Hong Kong Polytechnic University, *Hong Kong*

Personal and contextual factors are expected to be related to teaching approaches in higher education. Questions raise about which personal and contextual factors do have a significant impact upon teaching approaches. Investigating these factors can contribute to a better understanding why teachers teach in a specific way. Carrying out research in this perspective is also necessary regarding to educational innovations, because it deepens our present understanding of conditions which are obstructing or facilitating student focused or process oriented teaching. The symposium starts with a brief theoretical overview of personal and contextual factors who in previous studies were found to be related to teaching approaches. Next, four studies are presented in which relationships are further empirically explored between personal and contextual factors and teaching approaches in higher education. The influence of these factors are investigated in a variety of higher education contexts such as teacher education contexts, professional training programmes and university contexts. The four studies investigate relations between a whole complex of personal factors (e.g. gender, teaching experience, status, conceptions of learning and teaching) and contextual factors (e.g. teaching discipline, class size, students' expert level, students approaches to learning and effects of pedagogical training) and teaching approaches. The scientific relevance of this symposium lies in the broadening and deepening of our current understandings of differences in teaching approaches by taking into account the influences of a variety of personal and contextual factors. Relevance for educational practice lies in a better understanding of those factors which are significantly associated with teaching approaches and which are relevant to be taken into account in programmes of teacher training and professional development aimed to develop or change teaching approaches.

Why do teachers teach the way they do? Approaches to teaching in relation to context and demographic teacher characteristics
Ann Stes, University of Antwerp, *Belgium*
David Gijbels, University of Antwerp, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*

The purpose of the present study is to gain more insight into the relationship between teachers' approaches to teaching on the one hand and context and demographic teacher characteristics on the other. Data were collected from 50 teachers of the University of Antwerp and obtained from three sources: a Dutch translation of the approaches to teaching inventory (ATI), information given by the teacher and information obtained through the personnel department of the university. Only the conceptual change/student-focused scale of the ATI had a good reliability and was used for further analysis. Analysis of variance (ANOVA) showed no relationship between teachers' approaches to teaching and the context variables students' expert level, discipline of teaching and number of students in the classroom. Neither a relationship was found between teachers' conceptual change/student focused approach and the teacher characteristics gender, academic status, amount of teaching experience, age and intention to participate in a teacher training. Several explanations and perspectives for further research are discussed.

Teaching approaches in higher education: relations between conceptions of learning and teaching and teaching strategies
Vincent Donche, University of Antwerp, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*

Studies indicate that learning-environment related factors as well as personal characteristics like gender, academic discipline and teaching experience could have an effect on teaching strategies and teaching conceptions (e.g. Norton et al., 2005). This study aims to explore the relationship between different personal and contextual factors and teaching strategies in a non-academic context of teacher education. Data were collected from 119 teacher educators. We used an adaptation of an inventory of Roelofs & Visser (2001) to measure teacher educators' conceptions of own learning. The inventory 'Learning to Teach Process' developed by Oosterheert et al. (2002) to measure student teacher learning was adapted to measure teacher educators' conceptions of learning-to-teach. Teaching strategies were measured by 7 scales measuring the extent to which teacher educators succeed in implementing different types of learning environments ranging from more transmission-oriented/teacher-focused to more learning-oriented/student-focused learning environments. In contradiction to former research (Kember & Kwan, 2000) we could not find a sound relationship between more traditional conceptions of learning and teaching and the realisation of more teacher focused learning environments. As we also found significant correlations between more transmission-oriented/teacher focused learning environments and more constructivist conceptions of learning and teaching, inconsistencies or 'disjunctions' between similar conceptions and strategies occur which has also been found in former research (Murray & MacDonald, 1997; Trigwell and Prosser, 1996b). Possible explanations for disjunctions could be found in teacher characteristics like gender and teaching experience as these factors were found to be predictors for several conceptions about own learning and student teacher learning and were not found to be directly related to different teaching strategies.

Quantitative and qualitative analysis of the effect of pedagogical training on teaching in higher education
Liisa Postareff, University of Helsinki, *Finland*

The present follow-up study explores the effect of university teachers' pedagogical training on approaches to teaching and self-efficacy beliefs measured by Approaches to Teaching Inventory and an additional part measuring motivational strategies. In addition, the study analyses teachers' writings of their experiences of pedagogical training. From the inventory, the effect of pedagogical training on teaching is analysed among 35 teachers who had not participated in pedagogical courses after the first measurement in 2004 as well as among 45 teachers who had acquired more pedagogical training after the first measurement. The results showed that there were more positive changes on the measured scales among teachers who had acquired more credits of pedagogical courses since the first measurement than among teachers who had not acquired more credits. The results of the first and second measurements are compared. Of the 80 teachers who participated in the follow-up study, 70 wrote about their experiences of pedagogical training. Five broad themes arose from the data: 1) an ability to reflect on different aspects of teaching and learning, 2) an awareness of different aspects of teaching and learning, 3) self-confidence as a teacher has strengthened, 4) changes in conceptions of teaching and learning and 5) changes in teaching practices. The results of the study clarified and deepened our understanding of the effects of pedagogical training since previous studies have suggested diverse effects of such training.

Effects of university teachers' approaches to teaching on students' approaches to learning in a problem based learning environment
Jeanette Hommes, Unversity Maastricht, *Netherlands*
Wim Gijselaers, University Maastricht, *Netherlands*
Mien Segers, University Maastricht, *Netherlands*

Educational innovations like Problem Based Learning (PBL) should create a learning environment which stimulates students to engage in higher order learning activities. Nevertheless, recent meta-analysis on the effect of PBL does not present conclusive results. It is argued that PBL has a strong positive effect on the application of knowledge but not a strong effect on the level of knowledge of the students. Therefore, the question arises whether all the conditions for educational innovations are met. One of the influencing factors on student learning is the teacher's approach to teaching and learning. In this research a case study in a PBL environment is presented. A quantitative exploration of the teachers approaches to teaching and the student's approaches to learning showed a significantly higher preference for Conceptual Change Student Focussed (CCSF) teaching approaches instead of Information Transmission Teacher Focussed (ITTF) teaching approaches. The results from the students' questionnaires showed a significantly higher preference for deep learning approaches instead of surface learning approaches. In addition, the students perceived the quality of teaching significantly higher for the teachers with a CCSF approach instead of an ITTF approach. However, only low correlations were found between CCSF approaches and deep learning approaches of students. Additional analyses of the results showed a significantly higher preference for a CCSF teaching approach for teachers representing the soft sciences in contrast to the teachers of the hard sciences. Also the students of soft sciences teachers reported a significantly lower preference for a surface approach to learning. As a consequence the question may be raised how faculty development can enable teachers to develop teacher approaches and teacher skills which align with the needs of PBL curricula.

G 14
30 August 2007 08:30 - 10:30
Room: 0.81 Ortvay
Symposium

The positive side of teacher motivation: Why are some teachers engaged and satisfied with their jobs

Chair: **Uta Klusmann,** Max Planck Institute for Human Development, *Germany*
Organiser: **Mareike Kunter,** Max Planck Institute for Human Development, *Germany*
Organiser: **Uta Klusmann,** Max Planck Institute for Human Development, *Germany*
Discussant: **Einar Skaalvik,** Norwegian University of Science and Technology, *Norway*

Motivational research in educational settings has predominantly focused on student motivation. If the motivational features of teachers have been considered at all, the focus has tended to be on aspects that are typically associated with dysfunctional teacher behaviors, such as teacher stress and burnout. Moreover, most research lacks a foundation in established psychological theories. Inspired by the paradigm of positive psychology (Seligman & Pawelski, 2003), this symposium deals with the motivational resources that enable teachers to function effectively in their profession and to experience high levels of well-being and satisfaction. Bringing together international researchers from different theoretical backgrounds, questions to be addressed include: 1) Which motivational constructs from psychological research contribute to explaining committed and engaged teacher behavior? 2) Which contextual and situational factors foster positive aspects of teacher motivation? These questions are addressed by empirical studies that draw on different teacher populations, implement longitudinal and quasi-experimental designs, and employ sophisticated analysis methods such as multilevel modeling and structural equation modeling. Drawing on their findings, participants will discuss the need for a more comprehensive framework for studying teacher motivation, the added value of the positive perspective, and practical implications

Engagement and emotional exhaustion in teachers: A multilevel perspective on the role of contextual and individual characteristics
Uta Klusmann, Max Planck Institute for Human Development, *Germany*
Mareike Kunter, Max Planck Institute for Human Development, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Jurgen Baumert, Max Planck Institute for Human Development, *Germany*

Despite high rates of teacher burnout, the majority of teachers can be regarded as engaged and committed to their profession. It has therefore been suggested that research be extended to cover the positive side of teacher motivation, its determinants and consequences. The present study covers both engagement and exhaustion, examining the contextual and individual characteristics associated with these two highly relevant outcomes. Multilevel analyses were conducted using data obtained from a sample of 1939 secondary teachers in 198 German schools and their students. Whereas only a small amount of the variance in reported exhaustion was found between schools (ICC = .01), teacher engagement differed considerably between schools (ICC = .07). Moreover, contextual features such as the provision of social support from the principal and positive parent-teacher relations were associated with higher levels of engagement, even after controlling for several personal teacher characteristics. These results underline the importance of considering

contextual as well as individual resources, and of expanding the research perspective to cover the positive side of teacher motivation.

Goal orientations for teaching: How teachers' achievement goals are influenced by the school context and influence teacher enthusiasm and burnout.
Ruth Butler, School of Education, Hebrew University of Jerusale, *Israel*
Limor Shibaz, School of Education, Hebrew University of Jerusale, *Israel*

Student motivation has long been a major focus of research in educational psychology, but we know far less about the nature, determinants, and consequences of teacher motivation, at least in part because of the dearth of compelling theoretical frameworks. Recently, Butler (2005; under revision) applied achievement goal theory to teachers and showed that individual differences in the degree to which to teachers pursued mastery, ability-approach and avoidance, and work-avoidance strivings were coherently related to their help-related attitudes and behaviors. The main aim of this presentation will be to address contextual influences on teachers' achievement goals, and teacher goal influences on positive and negative aspects of teachers' engagement in teaching, based on data from two new survey studies. In Study 1, results from a sample of 430 Israeli teachers confirmed that teachers' perceptions of perceived school mastery goal structure, ability goal structure, and work avoidance were coherently related to teachers' personal mastery, ability, and work-avoidance goals for teaching. Study 2 then examined relations between teacher goal orientations, student perceptions of teacher enthusiasm, and teacher burnout in a sample of 53 teachers and 1300 of their students. Results confirmed that perceived teacher enthusiasm was significantly predicted by teacher mastery orientation; mastery orientation also predicted teachers' self-reported interest in teaching. In contrast, teacher work avoidance was highly correlated with burnout. Discussion will address implications of the present framework and results for understanding teacher motivation and creating school environments that can foster positive motivation and engagement for both teaching and learning.

Teachers' intrinsic need satisfaction: Its meaning for their well-being and instructional behaviour
Mareike Kunter, Max Planck Institute for Human Development, *Germany*
Uta Klusmann, Max Planck Institute for Human Development, *Germany*

Self-determination theory proposes that the degree to which the social context allows people to satisfy their intrinsic needs for autonomy, competence, and social relatedness is crucial for the development of functional motivations and behaviours in that domain (e.g. Deci & Ryan, 2000; Ryan & Deci, 2002). In two studies, we apply this theoretical framework to the domain of classroom instruction, and investigate whether teachers' experience of autonomy, competence, and social relatedness at the workplace is associated with higher well-being and more functional instructional behaviours. Study 1 employs a quasi-experimental approach, with questionnaires being administered to a group of 63 severely exhausted teachers and a control group of 62 nonexhausted teachers. Group comparison revealed large differences in teachers' need satisfaction. Study 2 is based on a one-year repeated measurement of 178 mathematics teachers and their students, drawn from a representative school sample. Regression analyses showed a significant effect of need satisfaction on teachers' exhaustion and job satisfaction, even when controlling for the baseline measurement. Moreover, students whose teachers experienced higher need satisfaction rated their mathematics instruction more favourably. In particular, teachers who felt more competent and autonomous were described as being better able to motivate students, as dealing more patiently with students' mistakes, and as offering more social support. These results indicate that teachers' well-being and functional behaviours are systematically related to the

amount of autonomy, competence and social relatedness they experience in the working environment. Further research is needed to investigate which aspects of teachers' social environment are responsible for transporting this experience of need satisfaction.

Student teachers' motivation, action-control beliefs, and behavior
Lars-Erik Malmberg, Department of Educational Studies, University of O, *United Kingdom*

In the present study three areas of teacher functioning are merged into one heuristic model of teachers' action-control: motivation (intrinsic / extrinsic), agency (personal, relational) and means-ends beliefs (personal, relational, and external), and behaviour (indirect / pro-social / direct / self-focused). A Structural Equation Model was conducted in a sample of 391 teacher applicants and students, fitting data well. Teacher motivation was posed as an antecedent of, and behaviors as an outcome of action-control beliefs. Intrinsic motivation was related to agency beliefs, personal/relational means-ends beliefs and direct behavior, indicating a beneficial pattern of perceiving actions as self-determined. A higher level of agency beliefs was related to more direct behavior and less indirect behavior. Extrinsic motivation was related to external means-ends beliefs and more self-focus. The findings regarding both pro-active and reactive behaviors, linked with motivation and action-control beliefs go beyond research on teachers' coping styles, and can hence encourage further theorizing on teacher development. Future studies need to address whether the same pattern of predictions hold up among student teachers with longer experience of teacher training, to what extent this configuration are related to teachers' commitment, observed behavior and well-being in working life.

G 15
30 August 2007 08:30 - 10:30
Room: 0.81 Ortvay
Symposium

Experience as a basis for teachers' pre-service and in-service learning

Chair: **Sanneke Bolhuis,** Fontys Teacher Education Tilburg, *Netherlands*
Organiser: **Elaine Munthe,** University of Stavanger, *Norway*
Discussant: **Cindy Hmelo-Silver,** Rutgers University, *USA*

The aim of this symposium is to address the potential of experience for teachers' pre-service and in-service learning. Teacher education is often viewed as theoretical and not sufficiently concerned with the realities and demands of classroom practice, and teacher education students often refer to practice sessions in schools as the most rewarding aspect of their education. Teachers' in-service work is demanding and schools often provide very little opportunity for collaborative reflection on practice that can enable experience to become an object of reflection and a vehicle for learning. The three papers presented in this session include analyses of an interview study of teacher students' perceptions of their teacher education and practice, a meticulous analysis of one video taped conversation among a group of four in-service teachers who are discussing their own video taped lesson, and a three year project involving video-based peer coaching for teachers. In concert with Feiman-Nemser & Buchman (1985) we question whether experience is as good a teacher as we would like to think. We also question whether teachers are given the opportunity to develop necessary skills and attitudes to learn in experience, and we question whether experience can be

expanded, deliberated, and can become a vehicle for teachers' learning. The discussant will expand on this topic by bringing in the question of virtual experience through video cases before opening up for a discussion among participants.

In-service teacher conversations as learning experiences?
June Junge, University of Stavanger, *Norway*

In this paper, we will present analyses of one conversation that took place among four secondary school teachers who are taking part in a 2-year intervention study. Teachers are provided with videotapes of their lessons and they discuss these together with the intent to understand more about classroom processes and instruction and to further develop their own instruction to enhance learning for students. The videotaped conversation that took place within this group of teachers was transcribed and analyzed in relation to an overall description of the structure and quality of the conversation; which topics were discussed, how long was each topic discussed, and an assessment of the quality of discussion based on whether these topics were questioned, investigated, debated, or reflected on in a meaningful way that may lead to new learning or deeper understanding. By looking more closely at the types of questions asked, we will question whether the lack of inquiry into the substance of the video taped lesson and lack of critical questioning observed inhibits learning. We will also question whether the intervention itself is able to provide the teachers with enough "surprises" to create potentials for learning, or whether the video films also simply contribute to teachers seeing what they are accustomed to seeing. The theoretical foundation for the study presented here is to be found in communication theory and learning theories. The study will also be placed contextually in secondary schools and possibilities provided for teachers' continuing learning in and from experience.

Stimulating teachers' professional development using video feedback with reciprocal peer coaching
Rita Schildwacht, Fontys University of Professional Education, *Netherlands*
Sanneke Bolhuis, Fontys University of Professional Education, *Netherlands*
Jan van den Akker, University of Twente, *Netherlands*

The aim of our study is to formulate design guidelines for stimulating teachers' professional development using video feedback in collaborative settings. We investigate guidelines concerning (a) video feedback, (b) peer coaching settings (roles of trainee, coach and observer), (c) coach training, (d) ownership of learning goals and (e) focus on outcomes in classroom. The main research question is: Which of the above characteristics contribute to teachers' professional development? The research design includes a number of cycles consisting of analysis, design, evaluation and revision. A coaching scheme for teachers was developed which consisted of the above five characteristics. Three consecutive prototypes of coaching schemes have been investigated. This paper reports on the findings after two cycles. The data include learning reports, observational notes, questionnaires and in-depth semi-structured interviews with all participants as well as video taped reciprocal peer coaching sessions. The effects were measured at three levels, namely, the participants' reactions, learning, and use of new knowledge. Within this scheme, teachers appear to learn on several levels: their classroom performance, their professional learning, and on coaching the professional learning of colleagues.

Using videocases in a problem-based course for preservice teachers
Cindy Hmelo-Silver, Rutgers University, *USA*
Sharon Derry, University of Wisconsin-Madison, *USA*

Problem-based learning (PBL) is a methodology for student-centered learning that relies on small, facilitated, collaborative groups. In PBL, students learn through solving complex problems and reflecting on their experiences. In the STELLAR project, we have adapted the PBL model to specifically support preservice teachers in gaining an understanding of educational psychology that they can transfer to their classroom practice. The STELLAR system is an online PBL environment that provides preservice teachers with an opportunity to engage with educational psychology concepts by using video cases as contexts for collaborative lesson redesign. The system consists of three components: an online educational psychology hypertextbook, the Knowledge Web; a PBL online module; and a library of video cases that present examples of classroom practice. These cases provide rich contexts that present opportunities for discussion as students engage in redesign of instruction depicted in the cases as well as providing links to the Knowledge Web, helping students understand how concepts apply to multiple cases. The PBL online module includes tools that scaffold students' individual and group PBL activities. These include a personal notebook where students record initial observations, a threaded discussion, where students share research, and a whiteboard where students discuss proposals for lesson redesigns. Over 400 students have participated in the STELLAR adaptation of PBL. During this time, we have conducted both qualitative and quantitative studies of learning in STELLAR. Quasi-experimental studies demonstrate that students in STELLAR courses develop a significantly better understanding of targeted educational psychology concepts than students in a comparison course. This presentation, will describe STELLAR environment and the results of our research.

G 16
30 August 2007 08:30 - 10:30
Room: 0.79 Jánossy
Symposium

Assessing development and learning: Rasch measurement of learning potential

Chair: **Trevor Bond,** Hong Kong Institute of Education, *Hong Kong*
Organiser: **Trevor Bond,** Hong Kong Institute of Education, *Hong Kong*
Discussant: **Philip Adey,** King's College London, *United Kingdom*

The potentials which students have for academic achievement are not always fulfilled in school systems. While cognitive processes might be labelled variously as cognitive development, problem-solving ability, or cognitive competencies, they are routinely held to be key components in student potential for academic learning. The common foci for these symposium presentations are developmental assessments over time and the calibration of those assessments on project-specific Rasch measurement scales. Because of the complementary nature of the independently conceived projects reported here, the symposium focusses in turn on the measurement of Piagetian cognitive development, the estimation of cognitive change during Vygotskian co-construction, the relationship between everyday and formal complex problem solving as well as the development of

mathematical abilities over time. Each provides unique empirical evidence which informs teaching, learning and assessment in primary and secondary school settings across five countries.

Linking indicators of cognitive development: Across tests, across stages, across countries
Trevor Bond, Hong Kong Institute of Education, *Hong Kong*

In order to provide an empirical account of aspects of cognitive development across the school years, data from over 400 children collected through five independently conceived and conducted investigations using six different tasks across five schools in two countries were subjected to simultaneous Rasch calibration. International research on the relationship between cognitive development and school achievement have revealed high inter-correlations at all school levels. In spite of their origins in Piaget's qualitative, structuralist account of development, both class-tasks, and multiple choice tests of cognitive development show excellent psychometric properties. The analysis took advantage of the robust nature of Rasch estimation procedures in the face of missing data, to analyse a data set where links across tests were dependent on common persons taking both tests and the links across persons were dependent on their taking common tests. Moreover, dichotomous data from a multiple choice test and polytomous data from a Piagetian interview could be analysed in one run. Data from 88 items showed remarkable fit statistics, supporting the claim that all tests measured a single underlying construct of cognitive development. The implications from this research for classroom testing, readiness for learning and other research into educational achievement are discussed.

Constructing complex problem solving competency scales by IRT models using data of different age groups
Gyöngyvér Molnár, University of Szeged Department of Education, *Hungary*
Benő Csapó, University of Szeged Department of Education, *Hungary*

This paper presents the results of a study aiming at assessing the development of students' complex problem solving (CPS) competencies and comparing the achievements in general real-life and school-context specific problems. A test battery consisting of overlapping tasks was developed and administered to ten age groups from grade 3 to grade 11 in Hungarian schools. To establish a developmentally valid scale, the achievements of all cohorts were transferred to the same scale by the means of Item Response Theory (IRT). Mathematics and science tests assessing the same knowledge base that was expected to be applied in the CPS tasks, but in a pure disciplinary form, were also administered. The results show slow development between grades 4 and 6 and a more rapid period between grades 6 and 9. Comparing the results of the disciplinary and CPS tests highlights the content-bound nature of students' knowledge and the difficulties of transfer. Achievement differences decrease within gender sub-samples and increase between the genders by age. Comparing the mean achievements in every grade with the PISA problem-solving scale, only a small number of the 9-17 year-old population, the 11th graders in grammar schools, reach the reflective, communicative problem solving level on the problem solving scale specially constructed for 15 year-olds. The difference in achievements within the same age group is higher than the mean achievement difference between different age groups. That is, there exist several years of developmental differences among the students of the same age groups.

Tracking the Growth in Mental Computation
Moritz Heene, Munich University, *Germany*
Rosemary Callingham, University of New England, *Australia*

This paper presents the results of a study aiming at tracking the growth in mental computation as an important aspect of numeracy. There is little information available, however, about appropriate sequences of learning, or what can be expected of students in different grades. The responses of 264 students in grades 3 to 10 of Australian primary/high schools to linked tests of mental computation were placed on a single scale using Rasch modelling techniques. In order to avoid methodological shortcomings of gain scores while investigating the measurement of change, a latent growth Rasch model was applied.

Critical role of the IRT in studying construction and co-construction of new cognitive competencies
Aleksandar Baucal, Department of Psychology, University of Belgrade, *Serbia*
Vitomir Jovanovic, Department of Psychology, University of Belgrade, *Serbia*

The main goal of this paper is to present how the Item Response Theory (IRT) can contribute to studies of construction and/or co-construction of new cognitive competencies. In many previous studies it is shown that experience with asymmetric and symmetric joint problem solving is related with better later results. However, in the research which is done by one of us (Baucal, 2003) results suggest that social interaction in some cases just help children to use better their already existing competencies although in some case it really create external space and conditions for building new cognitive competencies. These results stress necessity for improvement of classical pre-test and post-test design in order to be able to differentiate in more reliable way different effects of the joint problem solving. We believe that incorporating the IRT into the design can serve this role. Using of the IRT helps to measure pre-test performance not only by total number of items, but also to get detailed insight into success on items which are below and above of student competencies. Furthermore, it enables researchers to choose or design items which are the most appropriate for testing potential constructive role of social interaction in cognitive development. Finally, the IRT makes possible to measure ability on pre-test and post-test on the same scale. These ideas about contribution of the IRT to the field of (co)construction of new cognitive competencies will be exemplified by research design and data.

G 17
30 August 2007 08:30 - 10:30
Room: 7.59
Symposium

Self-regulation and homework behavior

Chair: **Ulrich Trautwein,** Max Planck Institute for Human Development, *Germany*
Organiser: **Ulrich Trautwein,** Max Planck Institute for Human Development, *Germany*
Discussant: **Detlev Leutner,** University of Essen-Duisburg, *Germany*

Few issues in educational research affect students and their families as directly as homework. Accordingly, the reasons why some students are more efficient and successful in their homework behaviour than others need to be examined. A main difference between classroom learning and

homework is the absence of a teacher. In school, teachers typically regulate much of the learning process. They allocate time to different forms of learning (teacher instruction, individual work, group work), monitor the progress made, and correct mistakes. When it comes to homework, however, students are responsible for regulating their own behaviour, although many receive support from their parents. This setting makes homework a very promising area for the study of self-regulated learning. In this symposium, five presentations report on recent developments and summarize central findings on the role of motivation and self-regulation in out-of-school learning. Lubbers et al. examine the influence of social-psychological factors on homework behaviour in a large student sample; importantly, they test how peers influence homework compliance. Trautwein and Lýdtke combine an interindividual perspective (focus on between-student differences) with an intraindividual perspective (focus on within-student differences) to predict homework effort in various school subjects. Schnyder and Cathomas use experts' low- and high-inference ratings of homework assignments to describe the quality of typical homework tasks in French as a foreign language. Schmidt, Perels, and Schmitz describe a training study aimed at improving homework motivation and behavior; process data obtained from homework diaries show that the program had meaningful effects. Finally, Villiger, and Niggli describe a large intervention study aimed at improving children's free time reading activities; important elements of the program include teacher and parent training as well as innovative procedures to link at-school and at-home learning. Detlev Leutner will discuss the five studies.

Homework behaviour: The impact of personality and friends
Miranda J. Lubbers, Universidad Autonoma de Barcelona, *Spain*
Greetje P. C. van der Werf, Groningen Institute of Educational Research, Unive, *Netherlands*
Hans Kuyper, Groningen Institute of Educational Research, Unive, *Netherlands*

Research on homework behaviour indicated that students´ motivation and cognitive ability and parental attitudes are important predictors of homework behaviour. So far, little attention was paid to the effect of social-psychological factors. The present proposal investigates the effect of personality and friends on three aspects of homework behaviour: time on task, procrastination, and homework strategies. Data were used of a large-scale cohort study in the Netherlands, the ´Secondary Education Cohort of Students´ (N = 19,391). The present study was performed on the first grade of Dutch secondary education. We performed multilevel analyses, in which classes were level 2 units and students were level 1 units. The analyses controlled for gender and cognitive ability. Results indicate that personality is a strong predictor of homework behaviour. Friends´ homework behaviours appeared to be significantly correlated, and friends´ personality explained some additional variance next to students´ own personality.

Students' self-reported effort and time on homework in six school subjects: Evidence for between-student differences and within-student variation
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Oliver Lüdtke, Max Planck Institute for Human Development, *Germany*

Effort on homework has a profound impact on student achievement. Researchers typically use an interindividual research design to explain homework effort. In this study with a total of 511 students from grades 8 and 9, an interindividual perspective (focus on between-student differences) was combined with an intraindividual perspective (focus on within-student differences). Multilevel modeling showed that students' homework effort was a function of between-student differences in conscientiousness and within-student differences in perceived homework characteristics (subject-specific quality of tasks and homework control), perceived

parental valuation of specific subjects, and homework motivation (subject-specific expectancy and value beliefs). Furthermore, a significant cross-level interaction indicated that perceived homework control by teachers had a stronger effect on students low in conscientiousness than on their more conscientious peers.

Homework quality in French as a foreign language
Inge Schnyder, University of Teacher Education Fribourg, *Switzerland*
Rico Cathomas, Freie Universität Bozen, *Italy*

The positive effects of homework have been confirmed in the past few years (Trautwein & Kßller, 2003, Cooper, Robinson, & Patall, 2006). However, the quality of homework assignments has remained subject to criticism. Homework assignments are said to be lacking in preparation and variety, while drill and practice remain overemphasized. Several researchers have called for homework assignments that adhere to quality standards (Nilshon, 1998), implement a diversification of methods, and are differentiated according to student ability (Brophy, 2000). Although a closer examination of the homework selection process has often been recommended, quantitative aspects of homework assignments still receive more attention than aspects of homework quality. The present study examines the quality of homework assignment on the basis of data obtained from written homework journals kept by a highly representative sample of more than 60 teachers of French as a second language in Switzerland. The journals were coded, classified, and evaluated systematically by experts using low- and high-inference ratings. The main research concern was the actual content of French homework and how its quality can be rated. The results show that drill and practice still play a dominant part in language teaching, regardless of school type, region, or teacher gender. The homework practices examined did not meet the requirements of high-quality assignments. Homework practices in an intervention group questioned simultaneously (22 teachers) differed significantly from the group without treatment.

Process-related analyses of students' self-regulated homework behavio
Michaela Schmidt, Technical University of Darmstadt, *Germany*
Franziska Perels, Technical University of Darmstadt, *Germany*
Bernhard Schmitz, Technical University of Darmstadt, *Germany*

The aim of our study was to evaluate 5th grade students' homework behavior from the perspective of self-regulated learning, homework being an important setting for the application of self-regulated strategies. A training program that aimed to enhance students' self-regulated learning was developed and evaluated. Students' homework behavior was conceptualized within a self-regulation perspective based on the process model of self-regulation (Schmitz & Wiese, 2006). The model differentiates between three phases in each learning process: the preaction, action, and postaction phases. Eighty-four 5th grade students (30 girls and 54 boys) between the ages of 9 and 11 (mean age 10.4, SD=.57) participated. Homework behavior was assessed by means of a learning diary, which students filled out every day immediately before and after doing their homework. The process data obtained were analyzed using trend analyses as well as interrupted time-series analyses. The trend analyses showed the intervention to have significant effects on variables at all three phases of self-regulation (e.g., self-efficacy). A multiple baseline design was used to verify the training effects on the basis of process data. The interrupted time-series analyses largely confirmed the expected training effects (e.g., motivation). In addition, ARIMA models were used to analyze the intraindividual relationships of variables. Most variables showed characteristics of AR(1) processes. The results indicate that homework behavior can be improved

by providing students with training in self-regulation strategies. The use of process analyses should be intensified in further research.

At-school and at-home reading – Review of an intervention program promoting the development of reading skills
Caroline Villiger, University of Teacher Education Fribourg, *Switzerland*
Alois Niggli, University of Teacher Education Fribourg, *Switzerland*
Sabine Kutzelmann, University of Teacher Education Fribourg, *Switzerland*
Philippe Leopold, University of Teacher Education Fribourg, *Switzerland*
Beat Bertschy, University of Teacher Education Fribourg, *Switzerland*

Studies of reading socialization show that the family context plays an important role in developing children's reading motivation and comprehension. School alone cannot provide all the necessary input. This presentation reports on an intervention program designed to foster reading based on a process of cooperation between the family and the school. Specifically, as part of their homework, children prepare texts that they then continue working on at school. In a training course, parents were given instruction in actions and behaviors that enhance children's independence and decrease practices of a directive/controlling nature. Some sessions were attended by both parents and children. The aim of these sessions was to teach the children to use simple reading strategies at home. Teachers were trained to direct children working in groups to formulate questions of their own about set texts. These questions served as the basis for team tournaments, with children scoring points for each correct answer. In addition to the set texts, children were given the opportunity to read and discuss books they had chosen themselves in a literary circle. Extracts from these books were presented to the class in the "Readers' Theatre". Thus, the program involved both motivational and cognitive activities. A total of 255 fourth graders in 14 classes participated in the project. 92% of the children's parents underwent parent training. Each experimental class was matched with a control class. Effects of this quasi-experiment are currently being analyzed with repeated measures analyses of variance, controlling for pre-training differences between the experimental and control groups. The dependent variables of primary interest are reading motivation, reading comprehension, and reading fluency.

G 18
30 August 2007 08:30 - 10:30
Room: 0.100C
Symposium

Effective tools for evaluating teacher professional development

Chair: **Manfred Prenzel,** Leibniz-Institute for Science Education (IPN), *Germany*
Chair: **Christian Ostermeier,** Leibniz-Institute for Science Education (IPN), *Germany*
Organiser: **Christian Ostermeier,** Leibniz-Institute for Science Education (IPN), *Germany*
Organiser: **Manfred Prenzel,** Leibniz-Institute for Science Education (IPN), *Germany*
Discussant: **Kurt Reusser,** University of Zurich, *Switzerland*

Teacher professional development is discussed as one of the key factors in improving classroom instruction. Thereby it is argued that conventional approaches to teacher professional development seem not to be meeting the needs of teachers and therefore are considered less effective than

alternative approaches. Those alternative approaches often take on a situated perspective (Borko, 2004) and are linked to national educational reform efforts. However, the question as to whether one particular approach is more effective than the other depends on scientifically based research. Educational researchers rely on evaluation tools to make evidence-based judgements. This symposium brings together researchers dealing with professional development approaches in different countries using different evaluation tools. Central questions being dealt with in the symposium are: - Which tools are … - … being used for evaluating teacher professional developement? - … adequate for different professional development approaches? - … being accepted by the teachers themselves? - … well suited to provide information on the effects of professional development on - teacher cooperation and quality development, - teachers' views on teaching and learning, - changes in classroom practices (methods, used classroom materials, …) or - learning outcomes on the side of the students? The researchers present an array of different evaluation tools that are currently beeing used to analyze those aspects. To name some, evaluators employ teacher and student questionaires, performance tests, classroom observations, or teacher portfolios. In the symposium advantages and disadvantages of different tools will be discussed on the basis of empirical findings linked to different teacher professional development programs. Because teacher professional development is strongly dependend on the cultural context, the symposium brings together examples from four different countries, namely the USA, Austria, Switzerland and Germany. Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. Educational Researcher, 33(8), 3-15.

Adaptive teaching competency and student learning
Christian Bruehwiler, University of Teacher Education St. Gallen, *Switzerland*
Marion Rogalla, University of Teacher Education St. Gallen, *Switzerland*
Franziska Vogt, University of Teacher Education St. Gallen, *Switzerland*

In this study the adaptive teaching competency of 49 primary and secondary school teachers and the learning achievement of their 890 students are examined. Ideally, teaching takes situated factors such as students' preconditions into account. Teachers' constant adjustment of planning and teaching to the individual learning processes of diverse students is what we mean by 'adaptive teaching competency'. At the heart of adaptive teaching competency is students' learning for understanding. To measure adaptive teaching competency new tools were developed. A vignette was employed to measure adaptive planning competency, a video test to measure adaptive implementation competency and a teacher science test to measure teachers' subject knowledge. The theoretical structure of adaptive teaching competency is confirmed empirically employing confirmatory factor analysis. Results of multilevel analyses and structural equation modelling are presented. Primary findings show a correlation between adaptive teaching competency and the quality of teaching as perceived by the students. High adaptive teaching competency for example seems to correlate with a better fit of teaching methods on students' preconditions, with higher student participation and higher teaching quality. These results can be interpreted as criterion-related validation of the construct adaptive teaching competency. In addition, first analyses show that students of highly adaptive teachers demonstrate larger achievement gains than students of teachers with lower adaptive teaching competency. Teachers' diagnostic planning competency seems to be especially relevant for student success.

Think globally, act locally: How a system-wide evaluation can serve multiple purposes
Steven A. Schneider, WestEd, *USA*

The National Science Foundation (NSF) initiated the Local Systemic Change funded 88 multi-million dollar projects. The initiative's primary goal was to improve instruction in science, mathematics, and technology through teacher professional development (PD) within whole schools or school districts. LSC projects were expected to align policy and practice, to engage in a range of activities to support reform, develop clearly defined, measurable outcomes for teaching, and an evaluation plan that provided formative and summative feedback. This paper focuses on the evaluation of one of the LSC projects that provided 100 hours of PD to 2000 teachers across 8 school districts that serves over 55,000 students. The author of this paper was the Lead Evaluator and part of the national Core Evaluation. The contribution of this work to the field is how a system-wide evaluation can serve both the needs of local sites for formative and summative feedback and also provides stakeholders and policy-makers data on the overall impact of a national initiative. All of the evaluation activities were driven by a set of core evaluation questions: · What is the overall quality of the professional development activities? · What is the extent of school and teacher involvement in LSC activities? · What is the impact of the LSC professional development on teacher preparedness, attitudes, and beliefs about mathematics and science teaching and learning? · What is the impact of the LSC on classroom practices in mathematics and science? · To what extent are the district and school contexts becoming more supportive of the LSC vision for exemplary mathematics and science education? · What is the extent of institutionalization of high quality professional development systems in the LSC districts? · The project focused on in this paper also collected data on the impact of the PD on student learning.

Effects of the Austrian IMST Fund of instructional and school development. Students' perception of learning environments, self-related cognitions and emotions
Florian H. Müller, University of Klagenfurt, *Austria*
Barbara Hanfstingl, University of Klagenfurt, *Austria*
Konrad Krainer, University of Klagenfurt, *Austria*

As a reaction to the poor results of Austrian high school students in the TIMSS achievement test, the IMST project was started. The so called "IMST Fund" is a national supporting system for the development of classroom instruction and schools. Its aim is to effectively stimulate innovations in the teaching of mathematics, science, technology and information and computer technology as well as in teacher training. The Fund provides financial, organisational, and evaluation support as well as consultation for teachers' innovation projects. This study investigates how the quality of students' self-related cognitions and emotions change within the projects first year. Of special interest is which conditions of the learning environment are responsible for the stability or respectively the change of self-related cognitions and emotions. Deci and Ryan's (2002) self-determination theory (SDT) provides the theoretical foundation of this paper. It allows a differentiated analysis of the qualities of learning motivation and also suggests that motivational processes are highly influenced by basic psychological needs for autonomy, competence and social relatedness. According to SDT it is supposed that the IMST projects develop powerful learning environments and foster self-related cognitions (e.g. self concepts) and emotions (less subject-related fear). Furthermore, self-determined and satisfied teachers should create supportive learning environments which positively influence students' learning processes.

Evaluating implementation: What works and what doesn't work in projects with a symbiotic approach of implementation
Cornelia Gräsel, University of Wuppertal, *Germany*
Kathrin Fussangel, University of Wuppertal, *Germany*
Judith Schellenbach-Zell, University of Wuppertal, *Germany*

In recent years, some endeavours have been made to disseminate research-based knowledge into the practical field of education. Innovation projects based on theories of situated learning use a so called "symbiotic approach" to point out the reciprocal dependency and profit of researchers and practitioners. The content of the innovation is constructed jointly by researchers and teachers. Thus, the teachers' ability and experience are valued in the process of implementation, and it is of great importance that teachers consider themselves as responsible for the content and success of the project. In this paper we want to argue that the specific role teachers play in projects with an approach of symbiotic implementation lead to specific consequences in terms of design and methods to be used in these projects. Our findings stem from the project "Chemie im Kontext" (Chemistry in Context), a project dealing with a context- and inquiry-based curriculum development for lower and upper secondary schools. At the beginning of the project, we pursued a kind of traditional empirical research strategy: We used questionnaires and tests to assess the view of teachers and the effects of the lessons on student learning. A major finding of this first phase of the project was that this traditional research approach wasn't appropriate to our symbiotic implementation strategy, as it didn't fit to teacher's role in the project. Thus, we changed our research methodology: We started a closer co-operation with teachers concerning the planning of research; we offered support and tools for teachers' own research activities and we used different forms of interviews. These changes will be discussed with respect to the "appropriateness of research in implementation projects".

How do teacher's accept the portfolio-method as a tool to support and evaluate professional development? Findings from a cooperative quality development program
Anja Friedrich, Leibniz-Institute for Science Education (IPN), *Germany*
Christian Ostermeier, Leibniz-Institute for Science Education (IPN), *Germany*
Uta Meentzen, Leibniz-Institute for Science Education (IPN), *Germany*
Imke Krebs, Leibniz-Institute for Science Education (IPN), *Germany*

In this paper we refer to the use of the portfolio-method to support and evaluate teacher professional development. Our study draws on data from the German program "Increasing the Efficiency of Mathematics and Science instruction" (SINUS-Transfer). This program's approach requires teachers to improve their teaching in a cooperative manner and with regard to didactical problem areas in classrooms. In order to support teachers working in the program we developed a customized portfolio concept. The so-called "subject department portfolio" requires teachers of one school to collaboratively maintain a portfolio. Colleagues keep their shared goals, further steps to engage in as well as examples of classroom material including comments and reflections in this portfolio. The instrument allows teachers to document and reflect on efforts to improve their teaching and to make their thoughts and developments accessible to others. Additionally, the portfolio has the function to yield important information on the success of the program. In this respect the subject department portfolio serves as a tool for evaluation on a program level. A central prerequisite for a successful use of the portfolio with regard to those aspects, is seen in the teachers' acceptance of the instrument. Therefore the main question we investigate in this paper is how teachers assess the portfolio. Teacher as well as school principal questionaire surveys are conducted regularly within the evaluation of the program. There teachers were also asked to rate

the portfolio instrument. Results of latent-class analyses show the acceptance of this tool differs widely between different groups of teachers. The study yields indicators on requirements that have to be met in order to effectively use the portfolio as a tool for evaluation. Findings will be discussed in the light of alternative forms of professional development as well as adequate ways of evaluating those approaches.

G 19
30 August 2007 08:30 - 10:30
Room: 0.100B
Symposium

Multiple perspectives on voice and agency in mathematics classrooms around the world

Chair: **David Clarke,** University of Melbourne, *Australia*
Organiser: **David Clarke,** University of Melbourne, *Australia*
Discussant: **Lieven Verschaffel,** University of Leuven, *Belgium*

The four studies reported in this symposium represent different but related analyses undertaken as part of the Learner's Perspective Study (LPS) (Clarke, Keitel & Shimizu, 2006; Clarke, Emanuelsson, Jablonka and Mok, 2006). The LPS is an international project investigating the practices and learning outcomes of mathematics classrooms in twelve countries. Among the research foci addressed within the LPS are the related issues of voice and agency within mathematics classrooms. The relative status accorded to student and teacher voice in the negotiated construction of mathematical knowledge and the associated agency offered within the norms of classroom practice are key characteristics by which one classroom can be distinguished from another; both within the same country and between cultures. Among the key components of classroom practice by which voice and agency are enacted, some of the most critical are: (i) the mathematical tasks employed in the classroom, (ii) the form of classroom questioning employed, (iii) student interpretation and participation in 'lesson events' and (iv) the distribution of responsibility for knowledge generation. Each of these four presentations addresses one of these fundamental issues, and the application of the associated analyses reveals just how different each is enacted in classrooms around the world. References Clarke, D.J., Keitel, C., & Shimizu, Y. (Eds.) (2006). Mathematics Classrooms in Twelve Countries: The Insider's Perspective. Rotterdam: Sense Publishers. Clarke, D.J., Emanuelsson, J., Jablonka, E., & Mok, I.A.C. (Eds.). (2006). Making Connections: Comparing Mathematics Classrooms Around the World. Rotterdam: Sense Publishers.

A functional analysis of mathematical tasks in Australia, the USA, Sweden, China, Korea and Japan
Carmel Mesiti, University of Melbourne, *Australia*
David Clarke, University of Melbourne, *Australia*

Tasks have long been recognized as crucial mediators between mathematical content and the mathematics learner. The activity that arises as a consequence of a student's completion of a task is itself a constituent element of the learning process and the artefacts (both conceptual and physical) employed in the completion of the task serve simultaneous purposes as scaffolds for

cognition, repositories of distributed cognition and cognitive products. Task selection by teachers represents the initiation of an instructional process that includes task enactment (collaboratively by teacher and student) and the interpretation of the consequences of this enactment (again, by teacher and student). In this paper, we examine the function of mathematical tasks in classrooms in six countries. Utilising a three-camera method of video data generation (see Clarke, 2006), supplemented by post-lesson video-stimulated reconstructive interviews with teacher and students, we can characterize the tasks employed in each classroom with respect to intention, action and interpretation and relate the instructional purpose that guided teacher task selection and use to student interpretation and action, and ultimately to the learning that post-lesson interviews encourage us to associate with each task. The significance of changes of social, cultural and curricular setting, together with changes in the participating classroom community, challenge any reductionist attempts to characterize instructional tasks independent of these considerations. Of equal interest are differences in learning outcomes arising from the use of fundamentally different mathematical tasks, such as highly decontextualised or abstract tasks (in Chinese classrooms for example) in comparison with contextualized or so-called 'real world' tasks (for instance, in one Swedish classroom).

Classroom questioning in Singapore, the USA and Japan
Teresa Benedict, University of Melbourne, *Australia*
David Clarke, University of Melbourne, *Australia*
Berinderjeet Kaur, National Institute of Education, Singapore, *Singapore*

This research project set out to identify and study the different types of teacher questions posed in three classrooms, namely from Singapore, United States of America and Japan. The study focused on the teachers' verbal questioning within a mathematical classroom, and attempted to link the types of questions asked to the teachers' pedagogical goals. The report also identifies the teachers' questioning behaviours and styles, and concludes by describing a pattern observed in the questioning techniques used. Differences and similarities in the practices of the three teachers were identified. Data generation employed three video cameras (see Clarke, 2006), supplemented by post-lesson video-stimulated reconstructive interviews with teacher and students. This provided a rich and detailed documentation of the questioning practices in each classroom. One of the major concerns of teachers today is the impact their questions have on their students' learning outcome and achievement. Hence, through these studies, we have identified specific questioning techniques and behaviours of teachers from different classrooms. The high percentage of low-cognitive-level questions asked in the classroom appears to be a consistent feature. Other patterns within teacher questioning will be reported and examined for their possible implications for learning outcomes.

Learning mathematics from classroom instruction: Linking lessons to learners' interpretation of classroom events in Germany and Japan
Yoshinori Shimizu, University of Tsukuba, *Japan*

This paper reports on the analysis of post-lesson video-stimulated interviews with the students in eighth-grade mathematics classrooms in Germany and Japan. The data analyzed in the current paper derived from the Learner's Perspective Study (LPS, Clarke, Keitel, & Shimizu, 2006). The methodology employed in LPS offered the teachers and the students the opportunity in post-lesson video-stimulated interviews to identify for the interviewer those events in the lesson that the participant felt to be significant. In the previous study, by juxtaposing their perceptions of classroom events in the sequence of consecutive lessons, discrepancies and agreements between teacher and the students were identified. In this paper, by linking the classroom events identified

by the students as significant to them with particular classroom episodes, the relationship between teacher's action during lessons and learning opportunities for the students are explored. The analysis described in this paper suggests that students can interpret classroom events differently from those intended by the teacher and that learning opportunities take place within the context of such interpretation by learners. The analysis reveals the richness and potentials of the collected data, as well as strength of the methodology, in the Learner's Perspective Study.

Distinguishing between mathematics classrooms in Australia, the USA, China, Japan and Korea through the lens of the distribution of responsibility for knowledge generation

David Clarke, University of Melbourne, *Australia*
Li Hua Xu, University of Melbourne, *Australia*

Asian classrooms have been described as 'teacher-centred' by both Western and Asian researchers, and contrasted, somewhat pejoratively, to the 'student-centred' classrooms advocated in the Western reform agenda. Previous research conducted as part of the Learner's Perspective Study in Asian and Western classrooms has suggested that important similarities and differences in practice are concealed by the superficial (and divisive) dichotomisation of 'teacher-centred' and 'student-centred' classrooms and these differences in practice are better understood in terms of the distribution of responsibility for knowledge generation. The research reported in this paper applied this new way of looking at teaching to well-taught classrooms in China (both Shanghai and Hong Kong), Japan, Korea, Australia, and USA in order to identify the similarities and differences between the practices in the different classrooms and the implicit pedagogical principles that underlie those practices. In particular, this project seeks to distinguish one classroom from another on the basis of the process whereby mathematical ideas are introduced into classroom discussion and subsequently revoiced and accorded authority. The methodology employed provided the opportunity to track the movement of mathematical ideas in either direction across the public/personal interface, to examine the opportunities provided by teachers for student articulation of mathematical terms and understandings, and to connect learning outcomes to particular classroom actions. Significant differences were identified between the classrooms studied, challenging simplistic characterisations of 'the Asian classroom' and suggesting that, irrespective of cultural similarities, local pedagogies reflect very different assumptions about learning and instruction.

G 20
30 August 2007 08:30 - 10:30
Room: 3.67 Békésy
Symposium

Research for development for learning in the ICT extended university

Chair: **Ake Ingerman,** Chalmers University of Technology, *Sweden*
Organiser: **Eva Wigforss,** Lund University, *Sweden*
Organiser: **Shirley Booth,** University of Witwatersrand, *South Africa*
Organiser: **Birgit Hansson,** Lund University, *Sweden*
Organiser: **Birgitta Norden,** Lund University, *Sweden*
Organiser: **Lotta Antman,** Blekinge Institute of Technology, *Sweden*
Organiser: **Lotty Larson,** Lund University, *Sweden*
Organiser: **Petter Pilesjö,** Lund University, *Sweden*
Discussant: **Vivien Hodgson,** Lancaster University, *United Kingdom*
Discussant: **Camilla Osterberg Rump,** University of Copenhagen, *Denmark*

The papers that make up this symposium have their basis in a common research project and take up significant aspect of it. The research focuses on learning in distance courses offered by the university, which are characterised by an element of outreach to unusual student groups on the one hand, and flexibility and diversity on the other hand. Learning is conceptualised as the constitution of meaning by the individual in the context that arises when their pedagogical history and their current socio-cultural surroundings meet the challenges of the course. The overriding research question that is addresses in the symposium is, In what ways are the concepts of flexibility, diversity and distance experienced by participants in distance courses, and how do they impinge on their learning in relation to the experienced context? The predominant research disposition is phenomenographic, which is to say that the research effort is to capture, analyse and describe the variation of ways in which participants experience significant features of their learning and their context for learning. The first three papers focus on, respectively, how a course for union members with poor educational background impinges on their life-worlds when the university and academic practices are both content and context for learning (paper 1); What young people from different countries and cultures learn when working interactively with a common content, "sustainability", in an extended global learning space. (paper 2); and how masters level students in an extremely flexible programme on Geographic Information Systems (paper 3) tackle their studies given a wide variety of ways to study. The fourth paper brings these three cases together to clarify the experience of distance, flexibility and diversity and thereafter to discuss them in a model for learning in the ICT extended university.

Coming to understand the university from a distance
Eva Wigforss, Lund University, *Sweden*
Shirley Booth, University of Witwatersrand, *South Africa*

The aim of this study is to consider the interaction between a distance course for adult learners and their life-worlds, when higher education is both the context and the content for learning. The paper is a case study of two women who take the course at the same time, with the aim of gaining a qualification to study further courses in higher education, and of improving their understanding of and skills for academic study. The case study is placed against a background of a broader study of

42 participants and the variation of ways in which they experience higher education and its academic practices.

Constitution of meaning for "sustainability" in global networked meetings
Birgitta Norden, Lund University, *Sweden*
Birgit Hansson, Lund University, *Sweden*

The purpose of our research is to analyze and describe the ways in which young people from many different countries and cultures who take a course (Young Masters Program, YMP) which focuses on sustainability experience their learning. We characterize the course as an extended global learning space in which the common content takes on first a local meaning that gradually becomes more global. The data were collected from open questions in a questionnaire given during the course that ran in 2006, some 550 of which were analysed to find themes in the broad concept of sustainability that the students related to their learning. The four following aspects of sustainability as related to what the students had learned were seen as significant themes which account for virtually all of the responses we analysed. Knowledge for sustainability Communication for sustainability Looking for sustainability Acting for sustainability It is fundamental that facts are needed to understand the issues involved, both locally and globally, on the basis of the wide local knowledge that comes from the students' diverse backgrounds and its meeting with the global common content of the course. The meetings between the course materials, the intercultural discussions and the students' own life-experiences, together constitute a context for learning. Communication occurs in the meetings between diverse cultures and is not just about talking to one another. Looking for sustainability is to be observing the society today related to sustainability. Constitution of meaning in this context is difficult to analyse and describe because of the complexity and the transdisciplinary nature of sustainability. The students consider that they by using the tools given for preventive environmental strategies, they have become more aware of sustainability, and they have improved their skills make professional analyses.

Diversity meets flexibility at a distance: Experienced affordances for learning
Lotta Antman, Blekinge Institute of Technology, *Sweden*
Lotty Larson, Lund University, *Sweden*
Petter Pilesjö, Lund University, *Sweden*

The aim of the study was to capture, analyse and describe the variation of ways in which students experience, understand and act in the fully internet-based two year international master's programme and how this impinges on their learning of GIS. For this paper we focused on in-depth interviews with nine strategically chosen students who accounted for their experiences of learning GIS in the first two courses of the LUMA-GIS programme. The results of the phenomenographic interview study were discussed in relation to two broader studies of the same population — one concerning flexibility-related actions (n=140) and the other concerning learning outcomes and course experiences (n=50) — in an effort to understand and make sense of the variation of ways in which they experience affordances for learning and make use of them.

Flexibility, diversity and distance in the context of learning – a consideration of 3 empirical studies
Shirley Booth, University of Witwatersrand, *South Africa*

This paper takes as a starting point that learning takes place against a context that is individual, and meaning is constituted in the meeting between the individual, with their history of learning

and learning situations, and the current learning situation, its knowledge content and the other people taking part in it. In distance education, this context is less visible and accessible than in on-campus education, and this is even more true for initiatives that extend the university outside its normal groups of students and its disciplinary and professional programmes of study. This paper is based on an extensive study of learning in three such distance initiatives, where it is conjectured that flexibility and diversity are the most outstanding features likely to affect the ways in which the students experience their own context for learning and thereby affect the quality of that learning. The variation of ways in which these contextual features are revealed to have been experienced by participants form the basis of the paper and are related to the specific course contents and populations in an emerging model.

G 21
30 August 2007 08:30 - 10:30
Room: -1.62
Symposium

When learners can control: Guidelines for effective learner-controlled instruction

Chair: **Saskia Brand-Gruwel,** Open university of the Netherlands, *Netherlands*
Organiser: **Wendy Kicken,** Open university of the Netherlands, *Netherlands*
Organiser: **Gemma Corbalan,** Open university of the Netherlands, *Netherlands*
Discussant: **Peter Gerjets,** Knowledge Media Research Center, *Germany*

Current educational theories emphasize the positive effects of providing learners with control over their own learning. Learners can be given control over different educational aspects (e.g., pace, sequence, guidance) and in different degrees (i.e., from minimum to maximum; Williams, 1996). However, research on learner control shows inconsistent and even detrimental effects on learning and cautions for its conditional effectiveness. What holds is that "…one can give control to all learners some of the time and to some learners all the time" (Snow,1980). Hence, research should no longer focus on whether learner control is effective, but rather on how to increase its effectiveness taking into account the specific form of learner control (i.e., educational aspects and degree) and learners' characteristics. The researchers in this symposium focus on the effects of learner control over different educational aspects and providing different degrees of control on cognitive, meta-cognitive and/or affective aspects of learning. Additionally, they provide guidelines to optimise learner-controlled instruction. Swertz discusses the misleading assumption that self-directed and teacher-directed learning are contradictory and shows that the integration of both needs to be the aim. Hassler gives learners different degrees of control over pacing in learning by means of narrated computer animations and measures the effect on students' judgment of confidence. Corbalan discusses the effects of limited learner control over task-selection on learning outcomes. Meeus shows how a portfolio can be used as an alternative for a dissertation model and its effects on learners' self-regulation. Kicken presents the effects of a development portfolio and task-selection advice on learners' task-selection skills and self-directed learning. References Williams, M.D. (1996). Learner-control and instructional technologies. In D.H.Jonassen (Ed.), Handbook of research for educational communications and technology (pp.957-982). New York: Simon & Schuster Macmillan. Snow, R.E. (1980). Aptitude, learner control, and adaptive instruction. Educational Psychologist, 15(3), 151-158.

The usage of learner control and program control in a web-didactics based LMS
Christian Swertz, University of Vienna, *Austria*

This paper reports on the statistical analysis of the usage of learner control and program control tools in an educational metadata based online LMS. The research is founded by the theory of evolutionary dialectics, that understands learning as a process of transferring cultural matter. In this process an agreement between teacher and learner is achieved not only on the knowledge, but also on way the knowledge is achieved. From this point of view program control and learner control are not a contradiction, but take place at the same time. This is operationalised through the educational metadata vocabulary "Web-Didactics" that supports learner control and program control at the same time. Using log files from the LMS InLearn (www.lerndorf.at) it is analysed whether learners prefer program control or learner control depending on course size, gender and level of experience with LMS. The data are collected in regular university courses. Data from 1.500 users and 700.000 page accesses are considered.

Learner control and learners' confidence in instructional animation: Exploring the "false confidence" hypothesis
Beatrice Susanne Hasler, University of Zurich, *Switzerland*
Beat Meier, University of Bern, *Switzerland*

The study addresses the "false confidence" hypothesis in instructional animation, and examines the influence of learner-control, item difficulty, and gender on learners' confidence regarding their understanding of an instruction. Three versions of an audio-visual computer animation and a narration-only presentation were used to teach primary school students the determinants of day and night. The animations were either system-paced using a continuous animation, learner-paced using discrete segments or learner paced using "stop" and "play" buttons. The students in both the learner-paced groups were more often over-confident, whereas the students in both the system-paced groups were more often under-confident. This effect was only found in easy questions but not in difficult questions. Male subjects were significantly more often over-confident compared to female subjects who were more often under-confident. Again, this effect was only found in easy questions but not in difficult questions. The interaction effect of experimental group and gender was not significant.

Learner control and task variability: Improving transfer and task involvement on genetics problems
Gemma Corbalan, Open University of the Netherlands, *Netherlands*
Liesbeth Kester, Open University of the Netherlands, *Netherlands*
Jeroen van Merriënboer, Open University of the Netherlands, *Netherlands*

This research examines the influence of shared control (a combination of system and learner control) and task variability over surface features on transfer of learning. It is assumed that shared control increases learners' willingness to invest effort, having a positive influence on task involvement and yielding higher transfer. In addition, variability over surface features is believed to trigger schema formation through induction from experience with various examples, increasing transfer. Eighty-six students participated in a 2x2 factorial design experiment with the factors control (system, shared) and variability (low, high). It is hypothesized that shared control will result in a higher task involvement and a higher transfer performance as compared to system control. In addition, a high task variability is expected to lead to a higher transfer performance as

compared to a low task variability. Results on task involvement and transfer performance reveal that when students are provided with shared control, they will benefit more from this shared control if the surface features of the tasks to choose from differ from those in the previous task.

Portfolio as a means of promoting autonomous learning: A quasi-experimental study
Wil Meeus, Vrije Universiteit Brussel, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*
Joost Meijer, University of Amsterdam, *Netherlands*
Linda Van Looy, Vrije Universiteit Brussel, *Belgium*

In teacher education degree courses for future pre-school and primary school teachers in Flanders the 'literature study with practical processing' is the most widely used dissertation model. A learning portfolio was developed as an alternative in order to better meet the central objective of the dissertation: i.e. autonomous learning. In this study both dissertation models were tested against each other using a pre- and post-test quasi-experimental research design. We used two existing questionnaires in order to reveal the differences between the experimental group and the control group via covariance analysis. A survey was also used. Our research shows that – among other things - the learning portfolio helps create a greater capacity for autonomous learning. Another important finding is the crucial role of the supervisors and, in particular, their confidence in the students' abilities to direct their own learning. This in turn brings us up against the so-called 'paradox of autonomous learning': students only learn autonomously when they are given sufficient freedom to learn autonomously.

Effects of task-selection advice on students' choices in learner-controlled instruction
Wendy Kicken, Open University of the Netherlands, *Netherlands*
Saskia Brand-Gruwel, Open University of the Netherlands, *Netherlands*
Jeroen van Merriënboer, Open University of the Netherlands, *Netherlands*

An intuitively appealing approach to flexibilisation of education is to delegate choices on instruction, such as the selection of learning tasks, to learners. Theory and research indicate several factors that influence the effectiveness of learner control over task selection. The common denominator of these factors seems to be availability of sufficient and relevant information during the task selection process (i.e., performance level and criteria, advice). This study examines the effects of three information resources on students' task selection and self-directed learning skills and performance in learner-controlled vocational education and training: (a) a digital development portfolio, (b) feedback on performance and self-assessment, and (c) advice (feedforward) on task selection. In a between subject design with two conditions hairstylist students (N=56) use a digital development portfolio to assess their performance and make task selections, without receiving any feedback or advice. After six weeks, students in the feedback-condition (N=29) are informed on the accuracy of their self-assessments and the specificity of their learning goals. The advice-condition (N=27) receives both feedback and task selection advice. They are informed on suitable tasks to select and on what learning goals are important to focus on during performance of these tasks, regarding their prior performance. Preliminary results show that students in both conditions make more accurate self-assessments and formulate more specific learning goals, after receiving feedback. Students in both conditions make appropriate task selections, but do not select specific and/or relevant learning goals to focus on during performance. This makes their task selection less effective. It is expected that the advice-condition will eventually improve their task selection skill more than the feedback condition, since the advice informs students on how to improve the

effectiveness of their choices. The findings provide practical guidelines for making on-demand education more informative and hence more effective.

G 22
30 August 2007 08:30 - 10:30
Room: 0.100D
Symposium

Motivation in context. Theoretical and methodological challenges

Chair: **Marold Wosnitza,** University of Science and Technology, Aachen, *Germany*
Chair: **Doris Lewalter,** TU Munich, *Germany*
Organiser: **Doris Lewalter,** TU Munich, *Germany*
Organiser: **Marold Wosnitza,** University of Science and Technology, Aachen, *Germany*
Discussant: **Peter Nenniger,** University Koblenz-Landau, RWTH Aachen, *Germany*

This symposium provides a platform for discussing some of the latest theoretical and methodological developments in the field of motivation research in learning contexts. To meet this aim, the presenters in this symposium describe research projects concerning a broad variety of formal and informal learning contexts and their influence on diverse motivational variables by using a broad set of methodological approaches. Marold Wosnitza (University of Science and Technology, Aachen) and Simone Volet (Murdoch University, Australia) focus on the question how group learning activities influence personal goals of university students in such settings. Susan Nolen, Christopher J. Ward and Ilana S. Horn (University of Washington, USA) concentrate on how students' goals becoming teachers arise and are modified through negotiation in social contexts. Peter Op't Eynde, Eric De Corte and Lieven Verschaffel (University of Leuven, Belgium), focus on the influence of the classroom context, especially classroom norms and practices with regard to mathematics, on the students' subject-related and motivational beliefs. Doris Lewalter and Claudia Geyer (TU Munich, Germany) investigate the impact of the organization and arrangement of science center and museum-visits in addition to science-classroom education on students' self-determined motivation and situational interest. Discussant Nenniger (University of Koblenz-Landau, Germany) will share his perspectives on these emerging ideas and methodological approaches.

A framework for personal goals in social learning contexts
Marold Wosnitza, University of Science and Technology, Aachen, *Germany*
Simone Volet, Murdoch University, *Australia*

Over the last decades, the construct of goal has been central in research on motivation in learning contexts. Whether conceptualised within a goal orientation perspective or from a personal content goal perspective, and whether elicited through metacognitive reflection or inferred from observations, individual goals are assumed to play a major role in engagement, learning and achievement. Yet, the growing shift in educational psychology research towards conceptualisations of learning and motivation as situated, social and dynamic has highlighted major limitations in conceptualising goals as relatively stable and as dominantly focused on the pursuit of achievement. The aim of the presentation is to present the development of a framework for personal goals in social learning contexts. The framework attempts to capture the construct of

goal into a comprehensive framework that integrates three aspects: social dimensions, multiple goals, and social-orientation. On the assumption that all aspects contribute to the nature of personal goals in a social learning context, all are integrated in the framework. In addition to discussing the conceptual grounding for the framework, we will present the results from several field studies conducted with German and Australian students involved in group learning activities across several programs of study (Veterinary Science, MBA, Education, Economics, IT). On the basis of these studies, we will discuss the usefulness of the framework to understand the nature, significance and dynamic nature of personal goals in real-life social learning activities.

The social construction of goals/definitions of success in learning contexts.
Susan Bobbitt Nolen, University of Washington, *USA*
Christopher J. Ward, University of Washington, *USA*
Ilana S. Horn, University of Washington, *USA*
Sara Sunshine Campbell, University of Washington, *USA*
Karan Manha, University of Washington, *USA*

Teacher education programs, schools, and specific classrooms are all achievement contexts for beginning teachers. As students become teachers, they are evaluated by many different authorities with different criteria for "good" novice teaching. Beginning teachers' goals are likely to reflect or respond to valued goals in the contexts where they learn. Achievement goal theories, criticized for a narrow focus, have mostly been studied in variable-centered survey or experimental designs. In our view, goals arise and are modified through negotiation in social contexts. Using ethnographic techniques, we document how beginning teachers' goals (or definitions of success) are co-constructed and pursued within and across specific social contexts. We identify the kinds of goals most salient to beginning teachers at different points in their professional development from early preservice training through the first year of teaching. We examine how relationships with others in multiple learning contexts, identity development, and institutional structures give rise to or shape achievement goals. Our analysis finds that goals arise in several broad achievement arenas, including student learning, classroom climate/management, pedagogical skill, student motivation, and getting a job. Some goals can be traced to teachers' own interests and learning history, or to cultural representations of teaching. These goals can be affirmed or challenged by their professors, students, supervising teachers, and peers. Definitions of success as a teacher (goals) must be negotiated with these others, in contexts in which stakes are low (peer groups) or high (cooperating teacher and supervisor, responsible for final evaluation). Negotiation of goals depends partly on the relative position of beginning teachers to other members of each context, as well as the ways each context is embedded in larger social/institutional structures. Implications for theories of goal development and change are discussed.

The impact of the learning context science centre/museum on motivational variables in secondary science education
Doris Lewalter, TU Munich, *Germany*
Claudia Geyer, TU Munich, *Germany*

Compared to formal learning environments, museums and science centres (M/SC) offer entirely different situational characteristics which are assumed to have an impact on learning and motivational processes. In contrast to traditional academic instructions in which the teacher conveys the information to the students, the presentation of information in M/SC proceeds nearly exclusively in a nonpersonal way and by a wide variety of media. These media are presented simultaneously and frequently allow or even require a cooperative learning process. Up to now,

this specific learning context has not yet been researched systematically, particularly with regard to motivational aspects. On the basis of two studies we examined how teachers organise their excurses to M/SC and which aspects of the visiting arrangements have a positive effect on the students' self-determined and interest-based motivation. In order to identify situational features of M/SC-visits beneficial for motivation, we conducted a postal-questioning of 1175 science teachers at 145 grammar schools (227 responded) in districts surrounding three prototypical M/SC. We also questioned 344 students of 14 7th- and 8th-grade classes and their teachers after they had visited one of the M/SC. The results of our studies illustrate on the one hand that M/SC-visits are frequently used as social learning contexts. Additionally it is shown that social aspects, such as the coorporative exploration of the M/SC, proved to be highly conducive to self-determined and interest-based learning. On the other hand, there are still clear possibilities for a utilisation-improvement of M/SC as learning environments: it was exemplified that teachers were not able to adapt the arrangement of the individual visits to the educational goals they aimed at. The importance of these findings for both the necessity of further research in the area of using informal learning contexts within academic education and for educational practice is discussed in this contribution.

G 23
30 August 2007 08:30 - 10:30
Room: 1.58
Symposium

Beyond dychotomies: factors that influence motivation such as competition and cooperation and incent

Chair: **Márta Fülöp,** Institute for Psychology, Hungarian Academy of Sci, *Hungary*
Organiser: **Márta Fülöp,** Institute for Psychology, Hungarian Academy of Sci, *Hungary*
Organiser: **Suzanne Hidi,** Ontario Institute for Studies in Education, Univer, *Canada*
Discussant: **Suzanne Hidi,** Ontario Institute for Studies in Education, Univer, *Canada*

The main goal of this symposium is to present recent research findings related to the motivational role of competition, cooperation and incentives, and to demonstrate that the dichotomous view of these phenomena that has been the ruling axiom in educational psychology for several decades is not longer sustainable. Just like in case of intrinsic and extrinsic motivation (e.g., Deci, 1975), mastery versus performance goals there have been values attached to cooperation and competition too, cooperation being beneficial and competition detrimental to achievement and interpersonal relationships in the classroom. More recently, researchers have argued that such dichotomies may not provide the most beneficial, true pictures (Hidi & Harackiewicz, 2000; Fýlßp, 2005), and that it is time to recognize the potential additional benefits of a more multidimensional nature of human motivation. Underlying these dichotomies has been the question of rewards that have been considered to be an aspect of extrinsic motivation and thus detrimental to learning. However, individuals may be pre-wired to want to receive rewards and to win, and the positive affect associated with them may be a motivational force that educators can no longer ignore. This proposed symposium focuses on examining various conditions that can contribute to competition and incentives to become powerful positive motivators of the learning process. Haraczkiewitz and Condly and Fýlßp draw on multiple studies to talk about competition and cooperation and the role of incentives, Williams & Sheridan present qualitative research carried out in preschool examining

the constructive role of competition and also its intertwined nature with cooperation. Kobal Grum demonstrates how different patterns of competition relate to self-concept in a cross-cultural study. In order to develop potentials for learning the most effectively the best possible motivational support is needed. This symposium aims to contribute to that goal.

Epistemic motivation and threat in competition: the double-edged sword of sociocognitive conflict
Judith Harackiewicz, University of Wisconsin, *USA*

Many theorists have debated whether educational activities should be structured in a cooperative or competitive manner in order to promote motivation and performance (e.g., Deutsch, 1949; Johnson & Johnson, 1989, 1990; Slavin, 1996). Findings from two lines of research, one conducted with elementary students at a basketball camp, and the other with college students playing word games, highlight the complexity of competition and illustrate the importance of considering social factors that moderate the effects of competition on motivation and learning. In particular, socially transmitted information about other people's performance can have epistemic value, especially when others find different solutions to a problem, stimulating task engagement and learning. However, this same information can be perceived as threatening, if it signifies inferior performance. Thus, the same social information may have very different effects depending on the competitive context in which people process the information, and the results of two experimental studies with college students shows that socio-cognitive conflict promotes task engagement and perceived competence in noncompetitive contexts, but undermines interest and confidence in competitive contexts. On the other hand, our findings from the basketball studies suggest that competition may have more positive effects when it involves intergroup competition in which individuals work together to compete against other groups. In these situations, we might expect information about peers' performance to have strong epistemic value and promote group learning

Does competition motivate and contribute to learning? The students' perspective.
Márta Fülöp, Institute for Psychology, Hungarian Academy of Sci, *Hungary*

In the educational psychological literature typically competition as compared to cooperation has been viewed as producing negative outcomes at both the individual (lower results in performance, higher anxiety level etc.) and at group levels. Competition also has been argued to reduce intrinsic motivation (Deci & Ryan, 1985) because of extrinsic rewards (such as grades, awards) and has been connected to performance goals and decreasing the level of achievements in the long run. There have been relatively few studies to reveal how students of different countries perceive the role competition plays in school and learning. We carried out two of these studies. One with high school students from Japan, Hungary and the USA (altogether 800 students) and another one with Hungarian high school and university students (641 respondents). The first study applied a questionnaire with open-ended questions, the second investigation used a questionnaire with closed-ended questions. The first study investigated how students see the presence of competition at the different levels of their schooling (primary, middle and high school) and also the kind of role it plays in studying. In the next study students had to evaluate the role and effects of competition during school lessons. Our results showed that students experience competition at all three school levels in each of the three countries and they attribute significantly more positive consequences to it (improvement, enhanced achievment, more will power etc.) than negative ones to it. Also, according to Hungarian high school and university students the presence of competition compared to the lack of it, contributes to higher activity, curiosity, attention and concentration, while evoking somewhat more stress. Our results do not confirm that competition undermines motivation,

students from different countries attribute more motivating than demotivating effects to it. Educational implications of the results will be discussed.

Competitiveness, school motivation and self-concept in different settings
Darja Kobal Grum, University of Ljubljana,, *Slovenia*
Among the various studies on cross-national aspects of the self-concept, there is a

Among the various studies on cross-national aspects of the self-concept, there is a lack of focus on the relation of the self-concept and competition. In our study, we reject the stereotype of competition not being a desired personal characteristic. Our principal hypothesis is that, if competition is investigated in a context of self-concept, positive dimensions of competition can emerge, as well as it may correlate with aspects of self-concept and furthermore that this relationship might differ from culture to culture. Thus there have been two particular aims of the research. The first one was to examine the relation between between self-concept and competition within each of the studied national groups. The second aim was to point to similarities and differences that may be detected in self-concept and competition among participants from different countries. The study comprised of 128 Slovene, 99 Serbian and 140 Spanish participants. Self-Description-Questionnaire was applied to measure general self-concept and specific domains of self-concept (SDQ III; Marsh & O'Neill, 1984). For gathering data in the field of motivation we have applied the Inventory of School Motivation (ISM) by McInerney et al. (1997). Two measures of competitiveness by Ryckman et al. were also used: hyper-competitiveness and personal development competitiveness (Ryckman et al., 1996). We found that individuals' personal development competitiveness is more related to social parts of self-concept (for example: relations with peers etc.) as well as with individual parts of self-concept (emotional stability, general self-concept). There are significant relations also with social areas of school motivation (social motivation). Contrary, hyper-competitiveness is more related with individually oriented motivation (motivation to win etc.). We also found statistically significant differences related to nationality, suggesting that Slovenes may be among the more competitive participants, but have lower self-concept in certain areas, than their peers from Serbia and from Spain.

Constructive competition in preschool
Sonja Sheridan, Göteborg University, *Sweden*
Pia Williams, Göteborg University, *Sweden*

The purpose of this paper is to draw attention to competition as a multidimensional phenomenon with constructive dimensions. Constructive competition can upgrade people and develop their ambitions but competition can also be defined as destructive, if it makes people compete with each other simply to gain personal privileges. Here, constructive competition is defined as an educational phenomenon that motivates children in learning situations to stretch beyond their own expected abilities. The questions at issue are: how do preschool children feel, communicate and act in competitive situations and what meaning do they give to competition? This presentation describes how preschool children compete and how they themselves express and conceive competition in different situations. The theoretical framework is based on an interactionistic perspective in which individuals and the environment influence and are influenced by each other in a continuous interaction. The study itself is an empirical study directed towards children's individual and collaborative learning in preschool as well as towards the conditions in this context that promote constructive competition. The data includes video-observations, individual and group interviews and children's drawings. The results highlight that competition is already part of children's life at this age group and that constructive competition is a dimension that can motivate

children to achieve beyond their own expected potential and at the same time it makes activities more exciting and interesting. Furthermore, constructive competition can be a dimension of children's collaboration, as well as their individual activities. The results provide information that can be used by teachers and educators to create conditions for competing in ways that make individuals grow, develop their self-esteem and ambitions. They also generate knowledge about to what extent individual versus collaborative work promote different forms of competition and how this is experienced from the perspective of children.

G 24
30 August 2007 08:30 - 10:30
Room: 1.60
Symposium

School organization and classroom instruction

Chair: **James Spillane,** Northwestern University, *USA*
Organiser: **James Spillane,** Northwestern University, *USA*
Organiser: **Lauren Resnick,** University of Pittsburg, *USA*
Discussant: **Lauren Resnick,** University of Pittsburg, *USA*

Disseminating instructional psychology so that it makes a difference in the world of classroom practice is difficult (Resnick & Spillane, 2006). Instructional reformers have partial success at most, and only rare experiences of high fidelity implementation, spread, and sustainability (Spillane, 2005; Cohen, 1990). Reasons offered for such limited success often focus on the individual implementing agent – the classroom teacher or school principal - and include difficulties related to practitioners' motivation, beliefs, and understanding. Scholars have also recognized that the environment and organization that surround any particular instructional intervention influences whether it is adopted into existing classroom practice. Mostly, however, we have treated context as a "limiting factor" as we continue with our preferred ways of disseminating our scientific knowledge such as telling people about new approaches, developing study tools that support particular learning about new approaches (Resnick & Spillane, 2006). This symposium will focus on examining the organizational dimension of changing instructional practice from a variety of different perspectives using empirical studies from four different countries. We argue that going to scale is optimized when organizational issues are taken into account. Developing potentials for learning in schools depends in important measure on organizational factors. The four papers focus on different dimensions of the school organization, examining how these dimensions enable and constrain changes in instructional practice. A central argument cutting across these papers is that scholars working to maximize the potential for learning in schools must take the organization into account.

Shifting student populations as impetus for organizational learning
Geert Kelchtermans, University of Leuven, *Belgium*
Katrijn Ballet, University of Leuven, *Belgium*

It seems obvious that changes in student population have an impact on teachers' daily work, more in particularly when these changes include the development to an ethnically and religiously diverse population. Yet, what this "impact" is and how it works out is far less obvious. In our

contribution, we report on a study that explored the impact of increasing ethnic diversity in schools on teachers' professional lives and school organizational working conditions. What does it mean for schools and teachers to work with such a changing student population? What challenges and "calls for change" go with it? And how do teachers cope with them? Case studies were built on 4 multi-ethnic primary schools. Data collection included extensive interviews with 4 teachers and the principal, observations and document analysis. Interpretative within-case analysis was followed by cross-case analysis (Miles & Huberman, 1994). In-depth qualitative case-studies in 4 multi-ethnic primary schools, reveal that the answer to those questions demands a close analysis of the interplay between the factual changes, the way they are interpreted by the staff (sense-making) and the structural and cultural working conditions in the school (also see, Ballet, Kelchtermans & Loughran, 2006; Ballet & Kelchtermans, in press). It turns out –for example- that it is not so much the confrontation with a multi-ethnic school population as such that constitutes a challenge and contributes to the intensification of the teachers' job, but rather the experience of facing pervasive changes in the school population and the need to revisit and change longstanding organizational and cultural working conditions as well as one's professional "self" as a teacher.

Schoolwork practices: Organizational routines and instructional innovation
James Spillane, Northwestern University, *USA*
Jennifer Sherer, University of Pittsburg, *USA*

The individual (albeit sometimes groups of individuals) rather than the organization is frequently the primary unit of intervention in our efforts to transform classroom instruction. In this paper, the author examines the role of schoolwork practices in enabling and constraining instructional innovation. Much of the work of organizations takes place in and through organizational routines that structure work practices from week to week and from year to year. Organizational routines frame and enable more or less efficient interactions among organizational members, provide stability across time, and assist in socializing new organizational members. Based on a mixed method longitudinal study of elementary (primary) schools, the author shows how organizational routines can simultaneously enable change (both continuous and episodic change) and constancy in schoolwork practices over time. Under certain conditions organizational routines can support substantial changes in schoolwork practices that enable a transformation of instructional practice. These changes tend to be episodic. Once institutionalized, however, these organizational routines serve to stabilize work practices over time though allowing for minor to modest continuous changes in practice. Under these circumstances, organizational routines can preserve the status quo in schoolwork practices, even in the face of dramatic changes (e.g., changing personnel, declining test scores).

The effect of psychological, organizational and leadership factors on professional learning in schools
Peter Sleegers, University of Amsterdam, *Netherlands*
Femke Geijsel, University of Amsterdam, *Netherlands*
Reinoud Stoel, University of Amsterdam, *Netherlands*
Meta Kruger, University of Amsterdam, *Netherlands*

To understand the complex nature of educational change, the capacity of schools to transform large-scale reform into accountable learner-oriented teaching practice has become a major focus in recent research into educational change. In studies within this field an organizational view that links structural, cultural and political aspects of the school organization to changes in teachers and teaching prevails. The results suggest that schools can be supportive environments for professional

learning and change. Research that attempts to elucidate the influence of social-psychological antecedents to teacher learning nevertheless however has shown that individual cognitive, affective and behavioral factors directly affect teachers' change. Systematic research in which organizational and psychological antecedents to teacher learning and change are examined in combination is scarce. To increase our understanding of change mechanisms, more research is needed that focuses on the interface between psychological factors and organizational conditions. This study makes a contribution to this line of research by testing the effect of psychological, organizational and leadership factors on professional learning simultaneously in order to estimate their relative effect on teachers' professional learning. Survey data from 328 teachers of 18 Dutch primary schools were used. As expected, the results showed that teacher motivation has strong effects on teachers' professional learning. Furthermore, differential effects of leadership dimensions and organizational elements on teacher motivation and learning were found. The authors stress the need to conduct research by means of models that contain both the organizational and the teacher level to better understand change mechanisms in schools.

The school as a knowledge creating entity: Creating the spaces for instructional innovation
Alma Harris, University of Warwick, *United Kingdom*

The need for organizations to change continuously has long been the central concern of organizational theorists. However organizations also need to be able to deal with new or changed circumstances effectively and this need is growing in an era of rapidtechnological advancement. Senge (1990) proposed that the learning organization has the capacity for both generative and adaptive learning as a sustainable source of competitive advantage. This paper draws upon a generic model of organizational knowledge creation (Nonaka and Takeuchi, 1995) to explore the ways in which schools can create the spaces to become knowledge creating entities. The focus of the paper is on the structural and cultural changes needed in schools to allow them to become knowledge creating and the ways in which schools are adapting their practices to share instructional knowledge and practice.

H1
30 August 2007 11:00 - 12:20
Room: PP1
Poster Session

Poster session

Chair: **Gert Rijlaarsdam,** University of Amsterdam, *Netherlands*

School culture inventory in school as learning organisation
Silvana Mosca, Ministry of Education, *Italy*
Raimondo Bolletta, INVALSI, *Italy*
Daniela Bachi, AVIMES Network, Turin, *Italy*

The contribution concerns self-evaluation in a network of schools in Italy, Spain, Poland and Romania involved in the VALINT project. The concept of school self-evaluation is based on the notion of educational quality analysed as regards different dimensions following the conceptual framework of organisational effectiveness developed by Quinn and Rohrbaugh. The four dimensions are: Human relations model, Open system model, Internal process model, Rational goal model. The approaches to school self-evaluation are: school-based review and organizational diagnosis. The methodology of action-research is used under the scientific consultancy of Jaap Scheerens. The interest in quality refers to the school as a whole and not just to the quality of particular aspects or elements. A questionnaire, "School Culture Inventory", based on the Quinn and Rohrbaugh framework has been applied to a population of 1.211 teachers grouped in schools of the four participating countries. School culture has been defined as "the basic assumptions, norms and values, and cultural artifacts that are shared by school members, and which influence their functioning at school" (Maslowski, 1997). The questionnaire aimed at diagnosing to what extent some values are shared by the staff working in the same school. In this way some schools can be described as mainly oriented towards achieving maximum output, in terms of student performance (rational goal model), while others may be more internally oriented to having good human climate. The data processing based on factorial analysis (variables) and on cluster analysis (respondents) produced profiles of each school represented by graphs suitable for inside school analysis and interpretation. The impact of results elicited questions, reflections, discussions and interpretations among teachers and headmaster: Do we recognize ourselves in this representation? Does the school culture favour the learning improvement?

Polymechanics professional identity in vocational education and training (VET): collective representations among trainees, trainers and teachers?
Benoit Gay-des-Combes, ISPFP-IFFP, *Switzerland*
Jacqueline De Puy, ISPFP-IFFP, *Switzerland*
Dolores Angela Castelli Dransart, HEF-TS, *Switzerland*
Valerie Perriard, HEF-TS, *Switzerland*
Zbinden Sapin Veronique, HEF-TS, *Switzerland*

From a scientific point of view, little qualitative empirical research has investigated components of professional identity and professional socialization, even less, in the context of vocational education and training (VET). As a matter of fact, two thirds of youth in Switzerland aged 15 and above are trainees in the VET system. Their ability to construct a coherent and positive professional identity can be quite important with regard to their integration in a tight labor market.

A valued and valuable professional identity also contributes more generally to well-being and self-esteem through the acquisition of a status in society. Social science literature on professional identity and professional socialization is abundant; however, technical and industrial professions have been relatively neglected, in comparison to others, such as social and medical professions. Our poster presents some of the results from an empirical, qualitative sociological study that investigates collective representations of professional identity among different groups of actors in the VET system, in the French-speaking part of Switzerland. The aim of the research is to grasp components of a valued and valuable professional identity, comparing the perspective of trainers, trainees and teachers. The whole study investigates two professions, one in the social domain, the other one in the industrial sector. Our poster presentation will focus on the latter, and specifically the polymechanics profession. Our analyses will examine how components of polymechanics professional identity differ or concur along the following three dimensions : - full-time school vs. dual (on-the-job and school) VET systems - official discourse and perception of VET actors - collective representations among VET actors (trainees, teachers and on-the-job trainers)

Peer interactions between «ordinary» pupils and pupils with special needs
Christine Berzin, University of Picardie, *France*
Corinne Lebert-Candat, University of Picardie, *France*

The purpose of this study was to analyse, from a socioconstructive perspective, spontaneous peer's interactions taking place between ¬ ordinary » pupils and pupils with special needs. More specifically, our aim was twofold: determine the part of tutoring interactions in the exchanges taking place between ordinary pupils and pupils with special needs, and determine the impact of the educational context (i.e., whether tutoring interactions are explicitly encouraged by the teacher or not, and whether the tasks given to the pupils requires individual vs. collaborative activity) on the occurrence of peers interactions. The participants were six French pupils aged 8 to 10, attending an ¬ integration class » (classe d'intéêgration scolaire) specialised in cognitive disorders. Each of them attended, on a part-time basis, an ordinary primary class (2nd, 3rd, or 4th grade) for some school subjects. The observations of peer's interactions took place during the activities taking place in ordinary classrooms. The results showed first of all, that pupils from the ordinary classrooms tended to behave in a way that facilitated the interactions and gave greater importance to the tutoring interactions. Secondly, the educational context seemed to influence the frequency and the nature of the interactions even though statistical analyses did not reveal significant differences between the instrumental and substitutive help. The more general issue of the role of ordinary pupils in the adaptation of their peers with special needs is discussed.

How can teachers' conceptions and practice of assessment be improved? Design and preliminary evaluation of a training program on assessment
Jesus Alonso-Tapia, Universidad Autonoma de Madrid, *Spain*
Fermin Asensio, Institute of Secondary Education "Maria Zambrano", *Spain*
Inmaculada Lopez, Institute of Secondary Education "Joaquin Araujo"., *Spain*

The main objective of this work was to carry out a preliminary evaluation of the effectiveness and limitations of a program for helping social science teachers to reflect on, learn and change their assessment practices if necessary. Previous studies had shown that teachers' ideas on valid criteria and procedures for assessing different aspects of learning are often inadequate. Based on this knowledge as well as on research on training conditions favouring teacher's reflection and change, a training program was designed with careful attention to content and training methodology. Nineteen social science teachers participated in the study. Evaluation centred on program

perception and teachers' learning on assessment. Information was gathered before and after each module through the use of a portfolio. Results showed a very positive evaluation of the program from the part of teachers as well very positive effects on actual learning, but also have helped to diagnose program limitations.

Novice teacher – mentor interaction during induction year: Guidance to organisational practice or mirroring of professional growth?
Eve Eisenschmidt, Tallinn University Haapsalu College, *Estonia*
Erika Lofstrom, Tallinn University, *Estonia*

The study explores novice teachers' professional development and growth during their first year of teaching. In the Estonian teacher education context the need has emerged to develop novice teachers' support structures during the induction year. Mentoring provides one means of supporting professional development, and mentoring practices have been addressed in a development project set up for the purpose of developing teacher education. The study describes sixteen novice teachers' experiences of mentoring during their induction year. The data is based on thematic interviews with the novice teachers, in which they reflect upon their professional growth and their experiences of mentoring. Results indicate that during the induction year there is a shift from a teaching-centred approach towards a learning-centred approach, which can be regarded as an expansion of the novice teachers' pedagogical awareness and indicates novice teachers' professional growth. The mentoring relationship was described in terms of socialisation into the organisation. Problem solving, feedback and support were the main ways in which the novice teacher and the mentor interacted. Whether this process truly implies collaborative and organisational learning or whether it is merely an adaptive process remains yet a question. Nevertheless, findings point to the direction that mentoring as a support structure during induction year need to be further developed and strengthened.

Interpersonal perception of teacher behaviour
Tim Mainhard, Utrecht University, *Netherlands*
Perry den Brok, Utrecht University, *Netherlands*
Mieke Brekelmans, Utrecht University, *Netherlands*
Theo Wubbels, Utrecht University, *Netherlands*

The focus of this study was to get insight into how accurate students in secondary education extract interpersonal information from teacher behaviour. Students' aggregated judgments of interpersonal behaviour based on short video fragments of teachers they were unacquainted with (n = 375), were examined in relation to judgments of students who knew the teacher for at least one year (n = 250). Based on 5 minutes video fragments students were asked to complete a version of the Questionnaire on Teacher Interaction (QTI-SIT). The original QTI measures student interpersonal perceptions of behaviour using a circumplex with Influence and Proximity as underlying dimensions (Wubbels et al., 2006). The judgments of unacquainted students predicted those of students who were acquainted with the teacher quite well. Also the general interpersonal perception of the teachers' behaviour (QTI), as it was measured in the acquainted classes one month in advance to the presentation of the video fragment, was predicted rather well by the students who were unacquainted with the teacher. Individual interpersonal perceptions of unacquainted students however, seemed to be hardly related with QTI scores in acquainted classes at all.

Layers of change at a teacher education college in Israel: Declared and in-action stories
Hanna Ezer, Levinsky College of Education, *Israel*
Miriam Mevorach, Levinsky College of Education, *Israel*

This study examines processes of change at a large education college during an era of change in teacher education in Israel. The research tools included protocols documenting college decision-makers' formal meetings and narrative interviews with twenty teacher educators, analyzed through qualitative content analysis. The results indicate the importance of the declared stories of decision-makers, who are influenced by external events and relate to critical changes at the college, and of the in-action stories of teacher educators, who operate within their own set of critical events. Their self-centered stories focus on personal and professional agendas, and partly reflect the declared story.

The follow-up and evaluation of initial teacher education in Finland
Ulla Kiviniemi, University of Jyväskylä, *Finland*

The Finnish Ministry of Education launched in 2001 a development programme for teacher education in order to provide guidelines for initial and in-service teacher education. The recommendations for initial education development concerned student selections, pedagogical studies, teaching practise, status of the teacher education and co-operation needed. The Institute for Educational Research conducted in 2005 a national follow-up and evaluation study over the recommendations of the development programme described above. This paper gives an account of the findings related to initial teacher education at universities. The study of initial teacher education was done in spring 2005 as a web-based survey. There were responses from the teacher education units of all the Finnish universities. Of the respondents, 301 (20 %) were teachers and 1 169 (80%) teacher trainees. The findings show that the pedagogical studies have already been developed in study areas relating to community-building as well as to individuality and diversity. However these areas should also be addressed in further development efforts. The extent of teaching practice was considered adequate; but more flexibility, choice and alternatives, and even international experience, should be available. In addition, individual counselling was still seen as a very valuable focus of development. In student selections the aptitude of the candidates and their level of motivation should be emphasised in the evaluation. The number of trainees at universities is reaching its limits and cannot be increased without further resource allocations. The results show that the educational recommendations of the development programme have been taken into account in the development of initial teacher education. Teacher trainees at universities have good opportunities for widening their expertise through various studies. The recommendations of the Teacher Education Development Programme are still topical.

Teaching Presence at different stages of developing an online community of teacher educators
Lea Kozminsky, Kaye College of Education, *Israel*
Olzan Goldstein, Kaye College of Education, *Israel*

This study examined indicators of "teaching presence" (Anderson et al. 2001), as expressed in messages posted by the moderators of an online activity of a community of teacher educators. The study focused on one community that demonstrated parameters of a "successful learning" model (Rosenfeld et al. 2002): High degree of participants' satisfaction, persistent activity and mutual commitment. A mixed method study was conducted to answer the following research questions: (1) Which of the teaching presence indicators appeared in the moderators' messages? (2) Were there distinctive teaching presence indicators that appeared at the different developmental stages of

the learning group? Data analysis was based on 234 online messages of the moderators. Content analysis led to the adjustment of teaching presence indicators to the teacher educators' learning community, and a descriptive statistics was used to study the frequency use of each indicator during various stages of the group development. Three frequently used teaching presence indicators were revealed throughout the activity: (a) emotional expressions/thanks and greetings (14%), (b) creating safe and inviting learning environment (14%) - both reflecting an emphasis on emotional-social encouragement that highlights the contributions of the participants., and (c) focusing/elaborating on the discussion topic (12%), which reflected the direct instruction role of the moderators as facilitators of knowledge construction. Comparison of the differential usages of teaching presence indicators during the various developmental stages of the group disclosed unique indicators at various stages, such as the organizational indicators of technological assistance and setting goals during the forming stage, or the content indicators of sharing personal experience, rehearsing and referring to others' messages, during the storming stage. The findings can assist to design, facilitate, and direct online learning communities of teacher educators in regard to the distinctive teaching presence indicators throughout the developmental stages of the group.

Perspectives and voices: Pre-service teachers' perceptions of a reflective practicum course
Senem Sanal Erginel, Eastern Mediterranean University, *Cyprus*
Ali Yildirim, Middle East Technical University, *Turkey*

This study aims to develop an insight into pre-service teachers' experiences of a reflective practicum course in relation to its goals, processes, and outcomes. Hence, it enables us to understand how pre-service teachers perceive a reflective practicum course. This is a case study which was conducted in the form of an action research in qualitative research paradigm. The participants consist of 30 final year pre-service teachers of English language in a 4-year undergraduate university programme in northern Cyprus. The research was conducted in the fall of 2004 for 12 weeks in a practicum course. In this study, the data was gathered from multiple sources, which are as follows: perception questionnaires, weekly journal entries, assignment on videotaped microteaching, and post-microteaching reflective interviews. The data analysis was carried out by following the content analysis method within qualitative research. The findings indicated that the pre-service teachers believed that the involvement in various experiences in this reflective course enabled them to self-analyze and to become self-aware of the changes in themselves, which contributed to the development of their self-identity as teachers. They expressed that they improved their competences and expanded their teaching repertoire, and thereby they developed themselves professionally. Furthermore, the pre-service teachers viewed that the constructive feedback from the course instructor and from peers contributed to their self-development. Also, the class atmosphere in this reflective practicum course was found to be unconventional with regard to its non-traditional setting, friendly, and interactive atmosphere. Moreover, the pre-service teachers emphasized that throughout the course, both the course instructor and themselves as novice teachers had multiple roles. In addition to these positive aspects, the workload, particularly in relation to journal keeping, was viewed as a drawback of this course.

A paradigm shift in inclusion: Towards an ecological approach
Michal Shani, Levinsky College of Education, *Israel*

This study describes a process of collaborative learning in a professional community, within the framework of partnership between Levinsky College of Education and an elementary school in which pre-service teachers practiced. This process reflects an attempt to change the existing model of inclusion of children with special needs in the school system, which is the 'individual model'. The underlying concept of this study is that an alternative to the existing model of inclusion in schools, an 'ecological model', has potential for creating an overall change, and for bringing about more effective inclusion than the individual model. This is because according to the 'ecological model', "the other" is not perceived as a factor that distorts the balance within the system, but rather as a significant component. The findings suggest that the adoption of the new model may take time, since there are general and personal aspects that promote the process of adoption on the one hand, or hinder it, on the other. An empirical basis for promoting the 'ecological model' as a leading model of inclusion in the school system was created on the basis of insights that arose from investigating the process of adoption of the new model.

H2
30 August 2007 11:00 - 12:20
Room: PP2
Poster Session

Poster session

Chair: **Erzsébet Korom,** University of Szeged, *Hungary*

Interaction between pre-school teacher and child(ren) - An analysis of educational practise in preschools
Anke Koenig, University Dortmund, *Germany*

How is preschool practice realized? How do preschool teacher interact with children and what kind of possibilities could children experience in these interactions with their preschool teachers? To be on the opinion that process quality in educational settings is from high relevance, we have to look inside the preschool practice to find out what is going on there. Results of diverse studies reveal, that children benefit from early childhood facilities. According to this preschool can be an effective intervention especially for disadvantaged and vulnerable groups of young children. This is only true if these facilities are of high quality (Sylva et al. 2003). Many developmental theories point to the fact that early experiences play a special part for the life course. These theories suggest, that early experiences are an important predictor of improvement in children´s development; especially supportive interactions with caretakers or preschool teachers indicating a high process quality are relevant, because the child-caretaker- as well as the student-teacher-relationship has a crucial influence on children´s development and later school success. Therefore we have to make sure, that high process quality predominates in our early childhood facilities

Data-texts in science education
Richard Duschl, GSE-Rutgers University, *USA*
Lucy Avraamidou, Intercollege, *Cyprus*

Contemporary policy documents seeking reforms in science education have called for substantial changes in our thinking about instructional approaches and the design of learning environments. Built upon Giere's views on model-based science, this paper proposes a contemporary approach to science education which we call Evidence-Explanation approach. This approach places emphasis on the epistemological conversations about data transformations in science. The process of data transformation, which we refer to as data-texts, we claim, unfolds the processes of knowledge construction and reveals the nature of scientific practice. Our claim is that a focus on the conversations surrounding the acquisition of data and the subsequent transformations of data to evidence, evidence to models, models to explanations (i.e. data-texts) can enhance the teaching and learning of and about science.

Worry as a barrier to learning: What are New Zealand preadolescent students worrying about?
Michael Townsend, Massey University, *New Zealand*
Neil Burton, University of Auckland, *New Zealand*

Worry in childhood has been linked to anxiety-related disorders and mental health conditions that reduce the potential for learning in school. The incidence of these psychological conditions appears to have risen in New Zealand over recent years. This study examined the content and frequency of children's worries in a sample of 111 'normal' preadolescent (10 and 11 year-old) children in New Zealand. Children first listed their worries in a free-response task. They then rated the frequency of their worry about 42 specific issues representing seven themes (school, home, social acceptance, appearance, health and safety, the environment, and the future). Ten percent of the children were also interviewed about the worries of children their age. All children completed a trait anxiety scale. Statistical analyses of the ratings indicated modest and similar levels of worry across all seven themes, with ratings significantly related to trait anxiety but largely unaffected by gender. Qualitative analyses suggested that worries were more likely to be about school, health and safety, and social issues. Worries had implications for school motivation, in particular, self-worth, confidence and perceived control. The results are discussed with reference to prior research overseas, and in terms of their implications for teaching and parenting.

TAO: architecture and use cases of a collaborative, internet-based platform for computer-assisted testing
Romain Martin, University of Luxembourg - EMACS research unit, *Luxembourg*
Thibaud Latour, CRP Henri Tudor, *Luxembourg*
Reginald Burton, University of Luxembourg - EMACS research unit, *Luxembourg*
Gilbert Busana, University of Luxembourg - EMACS research unit, *Luxembourg*
Ulrich Keller, University of Luxembourg - EMACS research unit, *Luxembourg*
Monique Reichert, University of Luxembourg - EMACS research unit, *Luxembourg*
Patrick Plichart, CRP Henri Tudor, *Luxembourg*
Raynald Jadoul, CRP Henri Tudor, *Luxembourg*
Judith Swietlik, CRP Henri Tudor, *Luxembourg*

The TAO framework is an open-source project which provides a very general and open architecture for computer-assisted test development and delivery. As upcoming evaluation needs will imply the collaboration among a large number of stakeholders situated at different

institutional levels and with very different needs for assessment tools, the TAO framework has the ambition to provide a modular and versatile framework for collaborative distributed test development and delivery with the potential to be extended and adapted to virtually every evaluation purpose that could be handled by the means of computer-based assessment. In order to illustrate the power and the flexibility implied by the TAO framework, several use cases of the architecture will be presented. Future developments and use cases of the TAO framework will be discussed.

Developing motivation through participation in collaborative activity
Judith MacCallum, Murdoch University, *Australia*
Veronica Morcom, Murdoch University, *Australia*

Motivation research has traditionally focused on the individual and is often couched in terms of goal theory. A sociocultural view of learning is at the heart of the developing conceptualisations of motivation. Learning is conceptualised as primarily a social activity and motivation emerges from the social context that is manifested through both collaborative and individual action. The main aim of the research is to examine children's motivational development in the primary school years. The paper draws on data from three research projects conducted in primary school classrooms using collaborative instructional practices. One broad research question guided the three studies: How is student's motivation created, sustained and transformed within a classroom community based on collaborative instructional practices and cultural values? The methodological approach involved in each classroom project was in-depth study of the classroom over a school year using a modified ethnographic approach, using a range of qualitative and quantitative data collection tools. Rogoff's (1995) personal, interpersonal and cultural/community psychological planes was used as a starting point for examining the processes of motivational development. The Community Plane shows the importance of the teacher's role in creating a collaborative classroom community. The motivational aspect of this plane may be described as developing ways for participation. The processes of modelling and scaffolding values and ways of participation are prominent on the Interpersonal Plane, with the interactions creating possibilities for motivation as 'negotiated participation'. Personal transformation of understandings was evident on the Personal Plane, with the motivational aspect presenting as students 'becoming' prepared to participate in subsequent similar activities. These findings are discussed in terms of their adequacy for describing motivational development and contributing to the debate on the relation between personal and culture. In practical terms, the focus of each project assisted the primary schools to further develop effective instructional practices.

Statistics in the physics laboratory
Haim Eshach, Ben Gurion University of the Negev, *Israel*
Ida Kuklianskey, Rupin Academic Center, *Israel*

The aim of the present study was to examine how students analyze raw data obtained from experiments in the physics laboratory. Specifically the following questions were addressed, do students understand: 1) why repeating measurements are conducted, 2) what kind of statistical tools are efficient and why, 3) the nature and origin of errors, 4) how to interpret graphs, and 5) how to reach conclusions based on the analysis. Based on literature review, observations in laboratory classes, and interview with students, a "raw data analysis" questionnaire was developed in order to evaluate the understanding of the raw data analysis process. The questionnaire, that referred to real data obtained in experiment on Newton's second law, contained questions relating to the following categories: A-Central tendency parameters, B-Experimental errors, C-Choosing

and understanding graphs, D-Fitting a trend line to measurements. Two groups of subjects were tested: 33 freshmen of an industrial engineering program and 25 participants of a physics teaching certificate program (referred to as "students" and "teachers", respectively). The finding showed that the performance of both groups was lower than expected with an average score of 62.25% (students- 57.89%, teachers- 68%). The most severe problem was in category D. These results indicate that the teachers have a marginal advantage in their level of understanding, possibly due to their increased experience and wider statistical background. A more in-depth analysis shows that although female students scored significantly lower than male students, female teachers scored insignificantly higher than male teachers. There was no significant difference between teachers and students for male subjects. This suggests a significant improvement with experience, among the female subjects. Understanding the difficulties students may face in analyzing raw data may significantly contribute making the laboratories more efficient learning environments.

The ecology of children's conceptual thinking and learning of science
Marjatta Kangassalo, University of Tampere, *Finland*
Kristiina Kumpulainen, University of Helsinki, *Finland*
Eva Tuominen, University of Tampere, *Finland*
Satu Vasama, University of Oulu, *Finland*
Karen Littleton, Open University, *United Kingdom*
Setsuo Ohsuga, University of Tokyo, *Japan*

This poster introduces an ongoing research project, which investigates children's conceptual thinking and learning of science in early years classrooms. Whilst taking an ecological stand to human activity and learning, the project aims at widening theoretical, methodological and pedagogical understanding of children's science learning in activity contexts mediated by socially shared inquiry learning activities, and modern technological tools. The research program approaches conceptual learning from the perspective of cognitive and socio-cultural approaches in order to illuminate the socio-cognitive processes of science learning when modern multimedia technological possibilities are in children's use. Consequently, the unit of analysis of the present research programme are to be found in both the individual and the social and their inter-dynamics. Theoretical and methodological foundations of the research project are laid by theories and set of concepts derived from cognitive and social psychology, cognitive science, studies of discourse, learning and social practice. The empirical data of this research project have been collected among young children aged between six to eight years, with a classroom community of 22 children. During science units children had possibilities to explore science phenomena using versatile tools, including a multimedia tool, PICCO. The data of the research programme have been collected by means of video-recordings of children's interviews before and after the science units. Video-recordings have also captured children's interaction processes during the actual participation in inquiry-based learning activities. Children's exploration paths in the multimedia environment have also been recorded. The analyses of the empirical data of this research project are currently undergoing. The main aim in the analysis will be to model children's collaborative inquiry and conceptual learning in science learning. The results of the research will be important for theoretical and applied research on conceptual thinking and learning as well as for educational practice with early years science learners.

How can different mentoring styles promote reading and mathematical literacy of mentor students?

Tova Michalsky, Bar-Ilan University, School of Education, *Israel*
Bracha Kramarski, Bar-Ilan University, School of Education, *Israel*
Itzhak Weiss, Bar-Ilan University, School of Education, *Israel*

The purpose of this study is twofold: (a) to evaluate the effectiveness of training junior mentors in different mentoring styles on reading literacy in an immediate and delayed assessment; (b) to examine the effects of mentoring styles in reading literacy on transfer ability of mathematical literacy in an immediate and delayed assessment. Participations were 205 tenth-grade students from ten Israeli high schools who participated in a mentoring program. Four mentoring styles were implemented based on the combination of two methods of metacognitive instruction: elaborated (MEI) vs. general instruction (MGI), and two techniques of teaching modeling: thinking aloud (TA) vs. transmission knowledge (TK). Three parallel versions of tests were administrated to assess reading and mathematical literacy: one at the beginning of the study, the second immediately after the end of the study, and the third at the end of the year (delayed test). The items focused on PISA's literacy theoretical framework (PISA, 2003). Results indicated differential effects of mentoring styles on reading and transfer ability of mathematical literacy. The metacognitive elaborated instruction (MEI) was most effective on reading literacy, whereas the thinking aloud modeling technique (TA) was most effective on mathematical literacy. Students who were exposed to metacognitive elaborated instruction embedded with thinking aloud technique (MEI+TA) outperformed students of other learning styles on the immediate and delayed mathematical transfer assessment. The theoretical and practical aspects will be discussed at the conference.

Long Life learning & training-: A new model of professional development for in-service teachers based on the Andragogy theory.

Anat Raviv, Ministry of Educatiion, *Israel*

The changes in the 21st society enforce the teachers to become long life learners. The education system in Israel is currently undergoing changes aimed the decentralization, modernization, upgrading and quality improvement of the teaching/learning system as a result of global and regional changes. Within this context, teachers are encouraged to view themselves as facing up new challenges supported by innovative forms of in-service training based on Andragogy – the theory of how adults learn. The paper critically explores the experience of the "long life learning" frames for in-service teachers in order to understand the new model that is offered' it's effectives on teachers professional development. The paper reports initial findings from a study that took place in 10 deferent PISGA centers, 61 programs. The research was conducted during 2003-2005 and assessed deferent training programs. In order to investigate and study more about these programs, a few research tools were used and analyzed by quantitative tools: closed questionnaires and qualitative tools: interviews and observations. The data that was collected was analyzed and presented in a mix method including qualitative and quantitative findings (Pasig ,2002 ; Raviv 2003), it presents teachers views and experience that participate in the training program and data that was collected from close questioners. The author of the proposal and paper has identified a number of principles of success long life learning models which have relevance not just for the Israeli PISGA, but for teacher education elsewhere as well as offering suggestions for change.

A review of edutainment-software
Claudia Schrader, FernUniversität Hagen, *Germany*
Theo J. Bastiaens, FernUniversität Hagen, *Germany*

Even though educational computer-games are becoming highly popular, the discussion of their educational value is still controversial. The debate within the scientific community is to much focused on technical features, design aspects and return-on-investment and less on the effects of this 'edutainment-software' on learning. The main aim of this paper is to present a review of critical variables that influence the learning effectiveness of edutainment, i.e. software that brings together education and game-like entertainment features. In order to analyze and illustrate typical game-based elements in edutainment-software, typical applications and examples are illustrated. Depending on the cognitive conceptual models of 'cognitive load' (Sweller, 1988) and 'invested mental effort' (Salomon, 1984), conditions and effects of edutainment-software are discussed in terms of their success for learning. Furthermore, it describes the results of a first inventory among students on their beliefs and perceptions of game-based electronic learning environments. It is expected that students show differences on their interest in-, and abilities and skills on edutainment software.

An interactive ICT demonstration of MAPS (Mental Attributes Profiling System)
Yiannis Laouris, Cyprus Neuroscience & Technology Institute, *Cyprus*
Pantelis Makris, Ministry of Education, *Cyprus*

In this ICT session, participants will have the opportunity to try out various computer based tests designed to evaluate selected mental abilities of the learning brain. The M.A.P.S. (Mental Attributes Profiling System) was developed to provide a psychometrical sound, yet a concise profile of cognitive abilities of school aged children (8-12 years old). The MAPS battery consists of eight language-independent tests and four other sub-tests (the last four) that measure language-related skills: (1) Short-term and working visual memory, (2) Short-term auditory memory, (3) Auditory discrimination, (4) Letter-sound and sound-symbol correspondence, (5) Visual-auditory discrimination, (6) Lateralization, (7) Navigational ability, (8) Eye-hand coordination and fine motor control, (9) Categorization, (10) Sequencing ability, (11) Letter sequencing, (12) Syntax, and (13) Comprehension. Past and current research on reading development has constantly shown that all the above attributes correlate significantly with reading and that, consequently, they can be reliably used to diagnose reading disabilities. The M.A.P.S. battery has been tested for construct, developmental, and diagnostic validity. Participants of the session will go through all modules, learn the theoretical background and use the tests. At the end of the session, a free fully-functional CD version will be handed out.

Memory and mathematics: A working memory training programme with primary school children
Marcus Witt, University of Bristol, *United Kingdom*

Despite considerable evidence that working memory is involved in children's mathematical performance (Gathercole and Pickering, 2000; Swanson, 2004), there has been little attempt to investigate possible mathematical benefits of working memory training. Forty-five children in Year 5 (9-10 years old) were given tests of visual-spatial working memory, central executive working memory and a test of addition to assess mathematical performance. Half of the group was then given a six-week programme of working memory training focusing on the central executive. The participants were selected using a matched-pairs design with participants matched as closely as possible for working memory and mathematical performance. Following the working memory

training, all the participating children were re-tested on working memory and mathematical performance. The effectiveness of the working memory training to improve working memory functioning and possibly mathematical performance was assessed. Possible implications for the classroom are also discussed.

H3
30 August 2007 11:00 - 12:20
Room: PP3
Poster Session

Poster session

Chair: **Pnevmatikos Dimitris,** University of Western Macedonia, *Greece*

Innovative learning space – The intermediate processes of individual and social learning in the workplace
Kaija Collin, University of Jyväskylä, *Finland*

Until recently the phenomena of workplace learning as individual and social processes has been approached as separate entities. Thus, too little attention has been paid to those intermediate processes which connect individual and social processes of practice and learning. In this study, the intermediate processes of individual and social practices of workplace learning are investigated. The aim of this study is to describe an innovative learning space which will be created through the linkage between individual and social learning taking place in various working contexts. The study will address the following questions: 1) which are the processes of individual and social learning which enhance innovative learning in the workplace? 2) Which are the mediating processes promoting productive and innovative learning processes at work? 3) How an innovative learning space will be created through the linkage between individual and social processes in the workplace? The study will be accomplished within an ethnographic framework. The empirical data will be based on observations and interviews conducted in various organisations and among occupations such as design engineers, doctors in surgery and carpenters. Various analytical tools will be utilised, including ethnographic, narrative, and ethnomethodological analysis. In addition, supplementary methodological tools, to answer the research questions, will be developed. The results will contribute to the need to deepen our understanding of the interdependence of individual and social learning processes. Consequently, in this study, on the bases of empirical findings focus will be put on intermediate processes of learning and on theory-building from inside the inter-disciplinary field of workplace learning.

Human cognitive architecture as a basis for the design of multimedia learning environments for older adults.
Mariya Pachman, University of New Mexico, *USA*

How can multimedia design promote learning for older adults? The goal of this paper is to answer this question using Cognitive Theory of Multimedia Learning - CTML (Mayer & Moreno, 2003) as a theoretical framework for design of multimedia learning environments on one hand and cognitive aging theories describing the existing declines on the other hand. Empirical data from cross-sectional studies with older adults suggests that some of the multimedia learning principles

can potentially better the elderly performance when the others should be applied with caution. Preferred modes and modalities of multimedia presentations can be especially influential for elderly and can enhance or hinder multimedia principles effects. Final part discusses a design framework adjusted to the elderly needs and explores the pathways for future research.

Workplace changes and workplace learning: Advantages of an educational micro perspective
Hans Gruber, Institute for Educational Science, *Germany*
Johannes Bauer, Institute for Educational Science, *Germany*
This poster gives an overview about a theoretical analysis of two perspectives, a macro and a micro perspective, on changes in the workplace in relation to workplace learning and professional development. It critically evaluates what kind of phenomena both perspectives can account for. Research from a macro perspective focuses on changes in economy or on organisational change. It helps to explore the role of lifelong learning and workplace learning in society as well as to define which competences are required in different professions. Research from a micro perspective focuses on individual reactions to changes in one's own workplace. It helps to explain how changes in daily work affect knowledge and skills on individual or group level. It is argued that the micro perspectives is advantageous if educational goals are pursued which aim at fostering workplace learning and competence development. Examples for empirical investigations are provided which illustrate the potential of a micro perspective on workplace changes and workplace learning.

Moral commitment, profit or a question of feasibility: Economics students' conceptions of 'responsibility'
Cecilia Lundholm, Dep. of Education, Stockholm University, *Sweden*

As part of a current research project on undergraduate students' learning about economy and environment, this paper explores economics students' reasoning about 'responsibility' in education. In higher education, the amount of economics courses including environmental issues and ethics is constantly increasing. However, recent reviews in the field of environmental education research have made clear that insufficient attention has been paid to students' conceptions and learning in the realm of social science, as opposed to natural science. In the light of this situation, this paper report findings from a study on students' reasoning about 'responsibility' concerning environmental and social aspects in business. The purpose of the paper is to describe the students' different conceptions and ways of reasoning about these issues, focussing specially on the moral views on 'responsibility'. The study that informs this paper was undertaken with 20 students at a course on 'Sustainable management' at the Stockholm School of Business. Questions for discussion were designed, including economical key concepts and issues related to environmental aspects of relevance to the business world. The analysis drew on concepts from research on students' interpretations of learning activities, in particular the distinction between the task as presented by the teacher and the problem (or 'project') as understood by an individual student. Drawing on data, the paper will present the outcomes in terms of the students' conceptions of business and the different ways 'responsibility' is perceived, for example, as a conflict of moral obligations and profit and feasibility. This paper is regarded as a contribution to the development of environmental education as a research-informed practice, focussing specially on the under-researched domain of the social sciences and environmental education.

Instruction monitoring – Implementation of new curricula within a video-based quality circle
Holger Gärtner, Free University Berlin, *Germany*

In order to implement new curricula, sustainable changes in instruction are necessary. Conventional methods of professional development, such as short workshops and seminars, however, produce no lasting effects. In this study, the concept of instruction monitoring is introduced as a new approach towards instructional development. The concept centres around a content-focused quality circle, in which teachers co-operate over one school year and discuss videotapes of their own lessons. The videos are to activate reflection: unconscious patterns of action can be noticed and attended to. This occurs in the form of collegial feedback within monthly group meetings. During the 2004/05 school year, fourteen mathematics teachers from Berlin schools participated in two quality circles. A further eight formed the control group who attended traditional professional development during the same period. The co-operation was aimed at implementing a new mathematics curriculum. Within a quasi-experimental pre-post test design, questionnaires were used for estimating the average effects of instruction monitoring compared with traditional professional development at teacher as well as student level. The average effects at teacher level were tested non-parametrically with u-tests. Owing to the larger sample size, effects at student level were examined with ANCOVA, using the pre-test score as the covariate. The results indicate a change in various aspects of instruction with respect to criteria required by the new curriculum (for example, the introduction of problem-based learning), as well as a shift in teachers' beliefs towards a cognitive constructivist orientation. At student level, an increase in self-assessed subject competence is observed. The results speak for the increased use of quality circles as a method for effective professional development.

Effects of a program to teach self-regulated use of reading strategies: A 2-year follow-up
Elmar Souvignier, University of Frankfurt/Main, *Germany*
Isabel Trenk-Hinterberger, University of Frankfurt/Main, *Germany*

Teaching reading strategies is a promising attempt to foster reading comprehension. During the last 20 years several instructional programs have been implemented successfully into regular classroom settings and in most of the studies children's knowledge of reading strategies and achievement in reading comprehension increased. However, long-term effects of strategy-oriented reading programs have been evaluated very rarely. The aim of our study was to analyse, if a strategy-oriented program would bring about long-lasting effects over the period of two school years. Eight fifth grade classrooms with 207 students participated in the study. The reading strategy program "Becoming a text-detective" which consists of 25 reading lessons was administered to six classes during the first half of the grade five school year. The other two classes served as the control group. Pre- and posttest data were collected immediately before and after the program. Retention tests were run at the end of the sixth grade school year. Competence in understanding the use of reading strategies, reading comprehension, and self-efficacy related to reading were assessed. Additionally, teachers completed a questionnaire concerning further use of strategy-oriented reading instruction. With respect to all three criteria, the text-detective group showed significantly higher long-term gains than did the control group. Effect-sizes varied from d=.31 (self-efficacy) over d=.37 (strategy knowledge) to d=.46 (reading comprehension). Short term effects turned out to be quite comparable to the retention effects, underlining the high stability of gains in the treatment group. Teachers declared that they were going to continue teaching reading strategies and that they would use the program again. The results underline that teaching reading strategies offers a high impact on the development of reading competence. A necessary condition for this result may have been that teachers were convinced by the program and stated to make further use of the programs' principles.

Developing students' learning potential through development of university teachers' teaching potential: preliminary evaluation of the teacher training program
Vlasta Vizek Vidovic, University of Zagreb, *Croatia*
Visnja Grozdanic, VERN - College for small business and enterpr., *Croatia*

The aim of this paper is to present preliminary results of the evaluation study of a newly developed training program for university teachers in Croatia ¬Active learning and critical thinking across curriculum in higher education». The program is based on three-phases framework for teaching corresponding to the information processing model of learning (Klooster et al., 2001). Three phases are: Evocation phase, Realization of meaning phase and Reflection phase. The program has started in 2003 and until now 187 participants from different higher education institutions and from different academic disciplines have completed it. The expected outcomes at the teacher level are defined as: ability to accept the role of teacher as facilitator of learning, attainment of teaching skills necessary to encourage students to become self-regulated learners, attainment of social skills for enhancing open communication with students, raised awareness of student diversity and their individual needs, deeper insight into one's own motives and actions, and becoming an agent of the changing teaching practices in academic community. Evaluation has been conducted at three levels: immediate, short-term and long-term level using both quantitative and qualitative approach. Evaluation results show that teachers perceive most of the intended outcomes as being achieved to a high degree. Moreover, their retrospective evaluations are becoming more positive over time. Average ratings for overall satisfaction with the course on a scale from 1 (poor) to 5 (excellent) are 4.56 for short-term evaluation, and 4.75 for long-term evaluation. The program evaluation will be further extended towards the examination of students' perception of the new approaches to teaching and learning.

Prior knowledge of students in the field of entrepreneurship
Iris Trojahner, Dresden University of Technology, *Germany*
Bärbel Fürstenau, Dresden University of Technology, *Germany*

Entrepreneurs are assumed to be essential for modern economies in order to assure economic growth and positive impacts on employment. In order to increase the percentage of entrepreneurs among the workforce, Germany initiated several economic measures. However, the high number of insolvencies of start-ups points to the necessity of qualifying to-be entrepreneurs both personally and professionally. The respective courses, curricula and instruction to be developed should attune to the prior knowledge of the learners. Up to date no studies about the prior knowledge of to-be entrepreneurs exist. Thus our study aimed at collecting and analysing data about the prior knowledge of students in the field of entrepreneurship. Our test persons were requested to draw their knowledge as a concept map by using paper and pencil. After conducting categorical and structural content analyses we obtained a modal concept map. It represents the knowledge of all test persons both in terms of structure and of content. In order to evaluate the modal concept map qualitatively, we created a reference map based on textbook models of Jacobsen (2003) and Wßhe (2002). The data show that the prior knowledge of the students hardly fits the reference map. The prior knowledge is predominantly related to the fields of sales and to locational factors because it is affected by the experiences of the test persons as customers rather than managers. Consequently, the challenge for curriculum development and instruction is to bridge the identified knowledge gaps of to-be entrepreneurs. The results of our study might serve as a data basis that provides insight into learners' prior knowledge. Entrepreneurship education has to attune to this in order to foster successful learning.

Workplace changes and workplace learning: Effects on stress and strain
Stefanie Kipfmüller, University of Regensburg, *Germany*
Hans Gruber, University of Regensburg, *Germany*
Helmut Heid, University of Regensburg, *Germany*

Modern workplaces are characterised by permanent changes which affect the employees' working tasks and routines. It has been argued that these changes may instigate informal learning processes. On the other hand, the need to cope with changes in the workplace may also lead to social and mental loads. Little attention has been paid to the possibility that changes in the current workplace may be related with social and mental stresses and strains. A study, which contributes to this topic, was conducted in the banking sector in German companies. Retail and corporate banking is characterised by a high amount of workplace changes in daily, weekly and monthly work. Subjects were N=150 customer consultants in retail banking departments. Each of them was affected by significant changes in the IT system of their banks. At three measurement points work-related mental strains and a number of different personal internal and external resources were assessed by questionnaires: (1) three months before the beginning of the change, (2) three months after introduction of the new IT system, (3) another three months after the implementation was completed. The results show that the workplace change was perceived as stressor which may cause mental strains of different severity. The "willingness to change" proved to be an important internal resource which allows coping with this kind of stressor.

H4
30 August 2007 11:00 - 12:20
Room: PP4
Poster Session

Poster session

Chair: **Manfred Hofer,** Universität Mannheim, *Germany*

Enhancing knowledge integration in high-school physics
Esther Bagno, Weizmann Institute of Science, *Israel*
Bat Sheva Eylon, The Weizmann Institute of Science, *Israel*
Hana Berger, The Weizmann Institute of Science, *Israel*

In this paper we describe learning tools – the "Knowledge Integration Routines", that aim to enhance knowledge integration in the context of physics learning. The routines are short generic activities that take 1-2 lessons to complete. They touch upon many important aspects of physics learning (e.g. formulas, lab work and problem-solving) and assist students to form selected relationships among the variety of learning contexts in which they encounter a certain topic. Students report that working on the routines, improved their understanding of physics as well as their ability to integrate various aspects of physics knowledge. They also use them spontaneously in the context of complex unfamiliar tasks. The results suggest that the routines advanced students' ability to relate a situation presented in a problem to theoretical knowledge.

Peer tutoring in problem based learning: students' perception and learning outcomes
Catherine De Rijdt, Maastricht University, *Netherlands*

Sibren Fetter, Maastricht University, *Netherlands*
Ellen Essers, Maastricht University, *Netherlands*
Janine van der Rijt, Maastricht University, *Netherlands*

One of the most salient and discussed aspects of problem based learning is the fact that many educational institutions make use of peer tutors next to their staff tutors. These peer tutors have the responsibility of leading the discussion group and assessing whether all the important subject matters are being discussed. An important question which keeps arising is whether peer-tutors are up to this task. This empirical study investigates, by means of a survey, first year law students' perceptions about peer tutoring versus staff tutoring. Furthermore, students' study outcomes were examined. The results give a good indication that there are no important long lasting effects from having either a peer or a staff tutor. While sometimes the peer tutor is seen as less experienced, this clearly does not translate to the perceived difficulty or the actual grades. This indicates that well trained and carefully selected peer tutors can be a surplus value within a Problem Based Learning education.

A participatory, design-based approach to enhancing engagement and motivation in academic gaming environments

Daniel Hickey, Indiana University, *USA*
Eun Ju Kwon, Indiana University, *USA*
Steven Zuiker, Indiana University, *USA*
Ellen Jameson, Indiana University, *USA*

The pervasive use and scholarly consideration of video games have led to an explosion of interest in games for learning academic content. Current efforts suggest the need to further refine motivation theory and practice concerning academic gaming. Guidance is particularly needed concerning incentives, which are essential in most non-academic games, but which are widely assumed to undermine intrinsic motivation. This paper proposes that participatory models of engagement and associated design-based research methods can provide useful guidance in this regard. Such models grant primacy to collective participation in domain-specific discourse, while treating both the cognition and behavior of individuals as "special cases" of socially situated activity. Our own model is being refined and tested in design-based studies of Quest Atlantis (QA), an on-line multi-user academic/fantasy environment for 8-12 year olds. Completing the various academic "quests" embedded in narrative "missions" gives students "cols" (used to purchase virtual or real commodities) and "lumens" (used to signify status within the narrative backstory). The most recent design cycle involved four classes of 5th graders who devoted ten class periods to learning ecological science topics and scientific inquiry. Two classes completed Taiga, a QA-based curriculum, while two other classes used a conventional textbook curriculum. Analysis of discourse "in QA" (student submissions, feedback, chat) and "on-QA" (student & teacher conversations) revealed ways that the incentives both encouraged and discouraged valued discourse. Conventional measures of individual cognition revealed comparable gains on near- and far-transfer measures of academic knowledge but a significantly greater improvement in domain interest in the QA classrooms. These insights are being used to refine Taiga and QA more broadly to enhance engagement and the resulting individual learning and motivation. In early 2007, multiple versions of the Taiga curriculum will again be implemented in the same teacher's four classes to more formally test several key refinements.

Perceived academic goal structures and cognitive engagement in classroom activities: an empiric study

Maria Luisa Pedditzi, University of Cagliari, *Italy*
Dolores Rollo, University of Cagliari, *Italy*

Several studies of motivation have suggested that students'engagement in achievement activities is motivated by a complex set of goals (Elliot, Dweck, 1988). Several sets of goals orientations have been proposed to explain differences in students'achievement behaviour. A distinction indicates mastery versus ability goals (Ames and Ames, 1984). It is possible to study the learning goals also considering the "perceived school goal dimension" (Roeser, Midgley, Urdan, 1996). This dimension includes "ability goal structure" and "task goal structure", and it can condition the perception of school psychological environment (Roeser, Midgley, Urdan, 1996). Teachers, through their systems and performances, can emphasize mastery progresses (task-mastery goals) or social competition (relative ability goals). Meece, Blumenfeld and Hoyle (1988) demonstrate that goal orientations are important mediators of students'engagement patterns in the classroom. We defined active cognitive engagement by students' reported use of metacognitive and self-regulation strategies. This study analyzes the relationship between perceived academic goals structures and cognitive engagement in classroom activities. We assume that perceived academic goal structures predict personal goal adoption and cognitive engagement in classroom activities. The instrument used consists in a selection of some items of different questionnaires elaborated by Roeser et al (1996) and by Meece et al (1988). The students who participated in this study are 680, attending to high school. Findings show that perceived academic goal structures predict personal goal adoption: specifically task goal structure predict personal task-mastery goals (R^3 =,213, F(1, 675) =183.221, p(1, 675) =162.155, p(1, 675) =174.608, p

The function of basic psychological needs in motivational process
Kiho Tanaka, Doshisha University, *Japan*

Self-determination theory identified three psychological needs: need for competence, need for autonomy, and need for relatedness, and proposes that social contexts such as autonomy support influence people's basic need satisfaction. In this study, the effects of autonomy support and the functions of three psychological needs are discussed. The results from two researches on motivational process suggested that autonomy supportive environment enhances the satisfaction of basic psychological needs, but it is needed to consider not only about autonomy support from person in higher position but also about mutual autonomy support. The results also suggested the different function of three psychological needs: the satisfaction of need for autonomy acts on the behavioral aspects, whereas the satisfaction of need for competence and relatedness acts on the emotional aspects of the participants.

Personality factors PF of medical students and their influence on self-estimated competence and performance related to intimate examinations.
Kristin Hendrickx, University of Antwerp, *Belgium*
Filip De Fruyt, University of Gent, *Belgium*
Benedicte De Winter, University of Antwerp, *Belgium*
Dirk Avonts, University of Antwerp, *Belgium*
Wiebren Tjalma, University of Antwerp, *Belgium*
Griet Peeraer, University of Antwerp, *Belgium*
JJ Wyndaele, University of Antwerp, *Belgium*

Aims University of Antwerp implemented in the renewed curriculum a project with Intimate Examination Associates (IEA). Students learn rectal, gynaecological and breast examination in healthy, trained volunteers. The project was assessed: the IEAproject had a positive learning effect on the performance and the self-estimated competence of medical students during internship. The question raised if student's PF influence their performance and if IEAtraining could meet determining factors in student's medical practice due to PF. We investigated: (1) correlations between students' PF and self-estimated competence concerning IE, (2) correlations between PF and the number of IE performed during their internship, and (3) influence of IEAtraining on the impact of PF. Methods Two groups were compared after their internship year: former curriculum FC students without IEAtraining and new curriculum NC students with IEAtraining. Instruments: (1) questionnaire on self-estimated competence and self-confidence concerning IE, (2) self-report questionnaire on intimate skills and performance during internships, and (3) NEO-PI-R, a personality inventory. Analysis by SPSS. Findings Results demonstrate correlations between PF and self-estimated competence for IE, and the number of examinations during internship. For FC as well as for NC a positive correlation is showed between "Extraversion" and "Conscientiousness" and the number of IE. There is a negative correlation for "Agreeableness" and "Neuroticism". Gender effects are investigated in relation to PF. Correlations between PF and performance variables for FC and NC are explored. The Extraversion factor "excitement seeking" is important for the performance of IE in patients of the opposite sex, in FC. For the NC, trained by the IEA's, individual differences disappear. Conclusion PF are related to self-estimated competence concerning IE and to the number of IE. The impact of PF is less important for students with IEA training. The NEO-PI-R personality inventory could be a valuable tool for training and coaching students in IE.

Participation in extracurricular activities and school adjustment in adolescence
Francisco Peixoto, I. S. P. A., *Portugal*
Lourdes Mata, I. S. P. A., *Portugal*

Aims University of Antwerp implemented in the renewed curriculum a project with Intimate Examination Associates (IEA). Students learn rectal, gynaecological and breast examination in healthy, trained volunteers. The project was assessed: the IEAproject had a positive learning effect on the performance and the self-estimated competence of medical students during internship. The question raised if student's PF influence their performance and if IEAtraining could meet determining factors in student's medical practice due to PF. We investigated: (1) correlations between students' PF and self-estimated competence concerning IE, (2) correlations between PF and the number of IE performed during their internship, and (3) influence of IEAtraining on the impact of PF. Methods Two groups were compared after their internship year: former curriculum FC students without IEAtraining and new curriculum NC students with IEAtraining. Instruments: (1) questionnaire on self-estimated competence and self-confidence concerning IE, (2) self-report

questionnaire on intimate skills and performance during internships, and (3) NEO-PI-R, a personality inventory. Analysis by SPSS. Findings Results demonstrate correlations between PF and self-estimated competence for IE, and the number of examinations during internship. For FC as well as for NC a positive correlation is showed between "Extraversion" and "Conscientiousness" and the number of IE. There is a negative correlation for "Agreeableness" and "Neuroticism". Gender effects are investigated in relation to PF. Correlations between PF and performance variables for FC and NC are explored. The Extraversion factor "excitement seeking" is important for the performance of IE in patients of the opposite sex, in FC. For the NC, trained by the IEA's, individual differences disappear. Conclusion PF are related to self-estimated competence concerning IE and to the number of IE. The impact of PF is less important for students with IEA training. The NEO-PI-R personality inventory could be a valuable tool for training and coaching students in IE.

Bullying, aggressive behaviours, school performance and risk of school dropout during early adolescence

Danielle Leclerc, Universite du Quebec a Trois-Rivieres, *Canada*
Michelle Dumont, Universite du Quebec a Trois-Rivieres, *Canada*
Marie Eve Lacroix, Universite du Quebec a Trois-Rivieres, *Canada*

This thematic presentation verifies the link between roles in bullying episodes, aggressive behaviours, school performance and risk of school dropout. The sample was composed of 479 teenagers who attended a public high school in the province of Quebec. Bullying was measured by the Olweus (1989) questionnaire. Aggressive behaviours were estimated by the Achenbach's behaviour inventory (1991). The risk of school dropout was evaluated by using the questionnaire developed by Potvin et al. (2003). School performance was measured by a question where we asked at the adolescent to identify their school's performance. Results indicated that 10.6% of the adolescents reported to have participated in a bullying episode, while 11% said to have been victim of bullying. There were 4.2 % of the adolescents who reported to have participated and said also to have been victim of bullying. On the order, there were 30.9% of the adolescents who said have never participated and never been victims of bullying. The three groups of adolescents who experimented bullying episodes reported a significantly higher risk of school dropout than adolescents without bullying experiences. The bully adolescents and bully/victim adolescents reported significantly less parental involvement in their daily school activities than victim and adolescents who reported no bullying experiences. The victim adolescents presented more positive attitudes toward school than bully adolescents. In the bully and victim groups, Pearson's correlations showed that aggressive behaviours were negatively correlated with attitudes towards school however delinquent behaviours were correlated with negative attitudes towards school and a low level of parental supervision. No significant differences were found between school performance and a role in bullying. Those results showed the links between the negative social experience, the adoption of negative behaviours and the risk of the adolescent to compromise their academic formation.

Applying science knowledge in real-life situations

Mária B. Németh, Research Group on the Development of Competencies,, *Hungary*

Having observed several years of steady decline in Hungarian students' science achievements, the University of Szeged Center for Research on Learning and Instruction launched a research project to examine the changes in students' use of their school-based knowledge in solving real life problems by collecting data with the same instrument in 1999 and 2006. A test containing 31 open

response tasks was developed and administered to a sample of 13- (N=3464) and 17-year-olds (N=2426). Conforming to earlier findings, most students in the present study could not apply what they had learnt in science classes when faced with a problem environment dissimilar to what they knew from school (means: 13-year-olds: 26 %p, 17-year-olds: 39 %p). Performances are distributed along an asymmetric curve skewed to the left, with higher success on items with contents bound to everyday personal experiences or phenomena present in the media. 2006 achievements were lower in both age groups. Difficulty indices calculated using the partial credit model (ConQuest) show that different tasks proved difficult at the two assessment points. Differences in task difficulty varied between 0.01 and 2.05 logits. It seems that curricular changes did not produce an overall effect, but they did facilitate learning in the case of a few concepts. A regression analysis revealed that complex problem solving, inductive reasoning and reading literacy contribute to explaining the variance of the applicability of science knowledge (13-year-olds: 24.7%; 17-year-olds: 30,6%). It seems that the knowledge tapped by the instrument originates from learning outside the school and draws mostly on a growing body of experiences and on the development of abilities, a finding worth considering for a more effective science education.

The "Excellent Teacher" perception by pre-service teachers and parents
Sari Bar-On, Levinsky college of education, *Israel*
Etti Bachar, Levinsky college of education, *Israel*
Itzhak Gilat, Levinsky college of education, *Israel*

The present study focused on comparing the perceptions of parents and pre-service teachers with regard to the profile of the "excellent teacher". Data were collected from 61 pre-service teachers and 51 parents who filled a questionnaire developed for the study. Items were based on analysis of "good teaching events" that were collected in a pilot study. Respondents were also asked to describe the good teacher by metaphors. The results show that both groups view the emotional interpersonal aspect as more important than the instrumental aspect in the personality of the teacher. In addition, facilitating learning abilities were viewed as the most important skills of teachers. The most characteristic category of metaphors to describe the god teacher was taken from the field of therapy.

H5
30 August 2007 11:00 - 12:20
Room: PP5
Poster Session

Poster session

Chair: **Frank Achtenhagen,** University of Gottingen, *Germany*

An autoethnographic action research study on the professional development journey of a practicing teacher: a case study school in Hong Kong
Eva, Suk Ying Chan, The University of Hong Kong, *Hong Kong*

With the publication of Educational Reform Consultation document in 2000, teachers in Hong Kong are required to engage in various kinds of professional programs to upgrade their professional knowledge and develop identity in the teaching profession to meet the challenges.

This longitudinal study comes about with the foci put on first, investigating my professional development journey as the panel head and curriculum planner of Personal Social and Humanities Education Key Learning Area (PSHE KLA) in a local new school. Second, exploring how the gained experience can be explained by "professional learning community" (Myers & Simpson, 1998) and "community of practice" (Wenger, 1998). This study used an autoethnographic approach and was conducted under the framework of participatory action research. Critical incidents were collected for interpretive analysis and triangulation of the research findings. As a matter of fact, local teachers are not encouraged to engage in systematic longitudinal research to enhance their professional development or satisfy their professional needs. The values of this study, therefore, grounded on the belief that it can help myself and colleagues in the same profession to acquire propositional, procedural or disposition knowledge that are needed to improve teaching practices; generate outcomes that can help improve students' learning and teachers' teaching; contribute to the establishment of the school "professional learning community" and "community of practice"; help generate experiences for other practicing teachers to conduct reflective teaching and enkindle the local and collective professional understandings of teacher practices in the local contexts. Since the collection of the interview data is still in progress, the interpretive data analysis, based on the written data collected, is at the preliminary stage only. The results to be presented are mainly narrative account derived from the initial understanding of the learning process that the researcher and her colleagues engaged in during the study period.

Promoting spaces for professional subjectivities and personal agency in work organisations: Long-term influences of an empowerment programme

Salme Hanninen, University of Jyväskylä, *Finland*
Anneli Eteläpelto, University of Jyväskylä, *Finland*

Learning for and through work has been often reduced as the acquisition of skills and knowledge. However, novel demands and challenges at work often necessitate the promotion of worker's professional identity and subjectivity. This is not always possible within the work organisations, where the organisational culture and narrow work roles may restrict wider dialogue needed for personal changes. We thus need procedures and programmes, which could promote individual empowerment outside the organisational constraints. However, the main question in such programmes is their effectiveness and influence on subjects' work orientations in authentic work contexts. This study addresses the influences of a subject-driven empowerment programme organised outside the work organisation. The programme was aimed to increase subjects' personal agency and professional subjectivities at work. Participants of the program were 19 middle-aged nurses, physiotherapists, and secretaries of a central hospital. The programme consisted of 12 days in one year working as a whole group and as sub-goups between. Subjects' own competenies, work philosophy, and the culture of work organisation were analysed. The programme utilized creative methods, such as psychodrama and sociodrama, visual arts, and narrations. Multimethod data collection used videotaping, questionnaires, and portfolios. Follow-up data were collected 6, 12 and 48 months after the programme. Theoretical approach was informed by subject-centred theories of identity. Becoming empowered was thus understood to manifest as subject's experience of his or her inner strength, as increased self-awareness and self-respect, and as an increased capability to social interaction. This poster describes how the influences of the empowerment programme were manifested in the long run after participating the programme. We especially focus on subjects' redefinition of their professional identities at their work contexts.

Spanish piano teachers' conceptions about didactics: the role of the educational experience.
Alfredo Bautista, Autonoma University of Madrid, *Spain*
Juan-Ignacio Pozo, Autonoma University of Madrid, *Spain*
Maria del Puy Perez-Echeverria, Autonoma University of Madrid, *Spain*

In this study we analysed some features of 45 Spanish piano teachers' conceptions about teaching and learning. Analyzing their written answers to an individual questionnaire exploring didactic ideas, by means of the lexicometric program SPAD-T (version 5.5), we could see lexical differences among groups of teachers, divided according to their professional experience. Factorial correspondence analysis was applied to the aggregate lexical table. The modal response procedure was also employed. Results revealed three groups of teachers with different conceptions, relying on one of the following representations concerning learning and instruction: direct, interpretative and constructive (Pozo et al., 2006). The less experienced group (less than 5 years) showed a constructive conception. The medium experienced group (between 5 and 15 years) showed an interpretative conception. Finally, the most experienced group (more than 15 years) showed a direct conception. The conclusions were: first, it seems necessary to develop teaching updating programs for Spanish piano teachers in order to acquire more appropriate and powerful conceptions; second, the results found with the statistical analysis of textual data fit researches using other methodologies; third, the statistical analysis of textual data is useful to infer mental representations or conceptions; this use is innovative, since it has only rarely been used to study subjects' textual responses.

Supervisory influence – reaching beyond the research degree into the pursuit of an academic career?
Maria Elisabeth Harde, University of Bielefeld, *Germany*
Lilian Streblow, University of Bielefeld, *Germany*

In a questionnaire survey of 119 psychologists currently undertaking doctorate degrees, the influence of social support, professional supervision and academic self-concept on the tendency to quit and the wish to pursue an academic career was examined. The final model indicates differences in effects on men and women dependent on the variable in question. Thus, the quality of the supervision shows coherence to the tendency to quit in women whilst it is connected to the wish to gain a professorship in the men. Moreover, social support does not affect the tendency to quit of women whilst it clearly is connected for men. For men the academic self-concept shows no connection to the wish to pursue a further academic career, whilst it does for women.

On representations of open knowledge..
Pal Fugelli, University of Oslo, *Norway*

Our studies conducted in the ProLearn project (Professional learning in a changing society) of computer engineers points towards open-source software projects as dynamic epistemic communities providing rich sources of distributed knowledge. Pieces of codes and chunks of knowledge are swiftly distributed and shared internationally. How can we as researchers understand the structure and representations of these objects? What properties do they convey to attract potential learners? Following a 'materialistic' trajectory, this presentation focuses on the object-side of the relation. The potential and attracting power of open knowledge is not necessarily restricted to software developing communities. Understanding the structure of open ended knowledge can provide educators with important clues on how to organize learning experiences

that nourish ties to knowledge cultures. This presentation aims to report on work-in-progress and invite conference participants to reflect on some of the key problems.

Attachment to work and continuing learning as influences on individuals' career stability and career transitions
Jenny Bimrose, University of Warwick, *United Kingdom*
Sally-Anne Barnes, University of Warwick, *United Kingdom*
Alan Brown, University of Warwick, *United Kingdom*

This paper draws upon narrative interviews with over 100 individuals who work in health care, engineering, IT or telecommunications; or have completed mid-career professional development; or are struggling to maintain a work-life balance as they are in permanent relationships but their work involves long-distance commuting; or have accessed adult guidance services. From these data sources it was possible to construct 'strategic biographies' of people who were either in work, had been made redundant, had taken a 'career break' or who were otherwise in transition. We will present some thematic findings but will also use individual cases in order to exemplify different patterns of behaviour in the development of work-related learning, careers and identities. The relationship between interviewees and their work-related roles can be represented as patterns of strategic action in their patterns of relationships, orientation and adaptive response to work. We examined two dimensions of interviewees' response to challenges of development of their learning, careers and identities. The first is the extent of their attachment to work (whether they identify with their work or offer more constrained commitment) and the second is the nature of the opportunities they had for, and their approach to, learning and development. Interestingly a strong attachment, or adjustment, to a current work role could act as a career 'anchor' from which it was possible for individuals to continue their career development (e.g. through willingness to engage in 'upskilling') or else as a 'chain' that restricted their perceived freedom of action (e.g. through unwillingness to engage in substantive 'upskilling' or 'reskilling'). Guidance often helps individuals manage career transitions by helping clients view their current skill sets as 'anchors' that can be taken with them on a journey and utilised in a new setting, rather than as 'chains' that hold them close to their current roles.

"Expatriates' " networking and knowledge transfer
Leena Salminen, Turku University, *Finland*
Erno Lehtinen, Turku University, *Finland*

ABSTRACT "Expatriates'" networking and knowledge transfer In the study the aim is to describe, analyse and explain how knowledge can be transferred in an organization, how employees (here called expatriates) build networks in a new environment (abroad), how much they use their previous network, how networking activities influence in expertise building, and how cultural change affects to knowledge transfer and personal networks. Theoretical background is based on socio-cognitive approach to expertise, theories of expertise, network theories and knowledge management. Empirical research was made in one company. Participants consists of 105 Nokia employees from Finland who have left for an international assignment during years 2000-2001 and arrived back during years 2001-2006. Most of them have worked abroad for two years. Host countries have been Brazil, Canada, China, Denmark, Germany, Hungary, Hong Kong, Italy, Japan, Malaysia, Singapore, South Korea, United Kingdom and United States. Three different research methods were used: pre and post questionnaires (n=105), interviews and egocentric network analyses (n=19). Participants for the network analyses group were selected after the pre questionnaire, with criteria like host country, home site, gender, job profile, function of the

position in company and family members following the employee abroad (altogether 19 employees were selected, 16 of them participated until the end of research period). Network analyses for them were made in the beginning, in the middle and in the end of the assignment. These persons were also interviewed in the beginning and in the end of assignment. Results of this study indicate how experts are networking in a new country, how their networks change during two years, how they transfer knowledge/expertise during assignment, what are the obstacles for knowledge transfer and how much the local culture and company culture affect to the transfer process.

Journal writing – As a vehicle for reflecting and enhancing learning processes of teachers and teacher educators
Nomy Dickman, Oranim, Mofet, *Israel*

Inspired by a constructivist approach and a qualitative-naturalistic theoretical framework, this study set out to explore the contribution of journal keeping in reflecting and enhancing learning processes of prospective mathematics teacher-educators. Data collection and analysis were guided by principles of the Grounded Theory. Analysis of 12 secondary teachers' journals in the course of becoming mathematics teacher-educators revealed three central issues: the source of learning, its goal, and its content, as main components in describing learning. Based on these findings, a three dimensional theoretical model was developed. The model reflects the learning mechanism of teachers in the course of becoming mathematics teacher-educators and the process of their professional development. This model can be used as a tool for analyzing journals and advancing reflective writing, as well as for planning and evaluating the training process of teacher-educators

The influence of individual-, training- and environment - related factors on training transfer
Christelle Devos, Catholic University of Louvain, *Belgium*
Xavier Dumay, Catholic University of Louvain, *Belgium*

The transfer of newly learned knowledge and skills into new situations has been largely studied. In the area of professional development, it has been showed that little of what was learned during training programs was subsequently transferred to the workplace. A critical issue is therefore to investigate the factors that are likely to foster or hinder transfer. The Learning Transfer System Inventory (LTSI; Holton, Bates, & Ruona, 2000) considers 16 factors likely to influence the transfer of training to the workplace. The purpose of this study was to translate the LTSI into French and to examine (1) the internal structure of the translated instrument, and (2) its predictive validity regarding transfer 1 to 3 months after training. First, a factor analysis revealed a factor structure very similar to the original structure: the 15 of the original factors were replicated. Second, 8 factors displayed statistically significant correlations with transfer: Information given to the trainees before the training, Similarity between the training and the job, Centrality of the transfer issues during the training, Expectancy that transfer will lead to a better performance, Expectancy that this increased performance will be rewarded, Motivation to transfer, Self-efficacy toward transfer, and Resources availability. The results also show that the factor Motivation to transfer and Self-efficacy mediate the relation between these variables and transfer. Finally, they are discussed and integrated into Eccles and Wigfield's expectancy-value model.

The learning professional's role in enabling the line managers to support learning transfer
Jasmina Hasanbegovic, University of St. Gallen, *Switzerland*

Training effectiveness depends on a multi-dimensional, systematic transfer management which systematically analyzes a broad array of influences at the individual, group and organisation level and thereafter generates appropriate high impact solutions and transfer interventions. Even if some researchers as well as reflective practitioners realize the need for accurate diagnosis, they investigate the measurement of key factors influencing training effectiveness from the learner's perspective, but not from those who are responsible for the management of transfer - the learning professionals. Taking into account the new demands for learning professionals as strategic business partners (Dave, 2004), this paper analyzes the transfer determinants for training effectiveness from the learning professional's perspective. The purpose of this study is to understand the challenges of learning professionals to be able to offer support and consulting for line managers in transfer management. Therefore, expert interviews and a complete inventory count were conducted within a case study at a business school of an internationally operating bank in Switzerland. The business school's activities aim at improving the bank's business processes by supporting the employees with appropriate training interventions. They are directed towards the line managers who are the contractor and budget allocator. The results on central transfer determinants were analysed by focusing on those who are responsible for the design of training and their relation to the business.

Diagnosis of specialised, social, cognitive and personal competencies in mechanical training – a theoretical and empirical model
Lars Balzer, Swiss Federal Institute for Vocational... (SFIVET), *Switzerland*
Andreas Frey, Swiss Federal Institute for Vocational... (SFIVET), *Switzerland*
Ursula Scharnhorst, Swiss Federal Institute for Vocational... (SFIVET), *Switzerland*

Compared to the body of research focusing on teaching and learning in grade school, research on quality in VET is still scarce. Also diagnosis of competencies in mechanical training is currently not based on empirically founded instruments and results. On the basis of the longitudinal study QuWibB (Quality of Vocational Training in Enterprises, see http://www.quwibb.info) we firstly define competence and suggest a theoretical model for structuring competence. Secondly, we exemplify how we can approach the problem of competence diagnosis: An instrument is presented which allows to diagnose the four competence classes specialized, social, cognitive and personal competencies in a valid, reliable and economical way. Then, models measured with linear structural equation modeling are used to modify the theoretical model and to show how the four competence classes interact empirically with one another. The high importance of cognitive competencies within mechanical training is finally illustrated with detailed results. Instrument, models and relevance for the field are discussed.

H6
30 August 2007 11:00 - 12:20
Room: PP6
Poster Session

Poster session

Chair: **Kirsti Lonka,** University of Helsinki, *Finland*

Meta-pragmatic talk with and between children as enhancing learning
Hana Avni, "The Kibbutzim College of Education and "The Hebre, *Israel*

The aim of this research is to highlight the importance of meta-pragmatic talk as a promoter of social and academic learning. The research presented is part of a longitudinal study on the development discourse skills of children in two age groups (4-7 and 9-11): (Blum-Kulka, 2004). The data were collected in two situations - natural peer talk and half-structured interviews with adults. Meta-pragmatic discourse is defined as the feedback which speakers provide to their own as well as to others' language behavior. This meta-pragmatic discourse examines, reviews, and comments on the correctness and exactness of words and expressions. Therefore, meta-pragmatic discourse is an expression of the ability to criticize human thinking and behavior – and as such, is related to literacy. Metapragmatic comments identified in the data were coded in three fields: a) talk about discourse management, b) meta-linguistic talk (Blum-Kulka, 1997; Aukrust, 2001) and c) reported speech. (Aukrust, 2001). The results show that the children from both groups and in both situations prefer to talk about discourse management as their first choice and meta-linguistic talk as their second choice. Qualitative analyses reveal that meta-pragmatic talk deals with three subjects; the mechanisms of conversation, dialogicity (Hamo & Blum-Kulka, in print) and literacy. The research suggests directions on how to use meta-pragmatic discourse to encourage social and academic learning.

Why becoming a teacher? Motivation for enrolling in a Post Graduate Teacher Education (PGCE) program
Dag Roness, Norwegian Teacher Academy, *Norway*
Kari Smith, University in Bergen, Norway, *Norway*

The present study is the first part of a longitudinal research project that will examine teacher student's motivation for the PGCE course and their motivation to become teachers. The population is full time PGCE students at the universities in Norway who (N=283) responded to a questionnaire in the beginning of their PGCE course in august 2006. This first part of the study focuses on the students' view on the PGCE course and the teaching profession. The students were asked why they want to be teachers and what kinds of expectations they have for the PGCE course. The analysis is still in progress, but preliminary findings show that the students are motivated both for the PGCE course and for the teaching profession. They start their studies with a positive attitude to the PGCE course which they find is needed in order to be confident in the teacher role. They are looking forward to become teachers. Yet the most important motivator seems to be their personal interest in their individual subjects. The results are analyzed in relation to motivational theories of intrinsic and extrinsic motivation. The main theoretical framework is Deci and Ryan's Self-Determination Theory (1985) Reference Deci, E. D. & Ryan, R. M. (1985) Intrinsic Motivation and Self-Determination in Human Behavior. New York: Plenum Press.

Exploring the development of scientific explanations and its effects on student learning
Maria Araceli Ruiz-Primo, University of Colorado at Boulder, *USA*
Shin-Ping Tsai, University of Washington, *USA*
Min Li, University of Washington, *USA*

Scientific explanations are important for students to construct their understanding scientific knowledge and link the knowledge with evidence. It is vital to instructionally support and measure the growth of students' explanations in teachers' daily practice. The purpose of this study is to explore methods to model the general growth trajectory of students' learning of scientific explanations as well as its variability. Using the student notebook scores on four investigations within a physical science unit, a series of three-level hierarchical linear models will be conducted to identify the learning trajectory of student learning in the context of inquiry-based instructions. We will examine the mean and variability of the individual and group growth curves on students' proficiency in scientific inquiry. Finally, we will discuss the issues related to methodological challenges and educational implications regarding to inquiry-based instructional and assessment practice.

Students' handling of graphs in university
Maria-Puy Perez-Echeverria, Universidad Autonoma de Madrid, *Spain*
Yolanda Postigo, Universidad Autonoma de Madrid, *Spain*
Juan-Ignacio Pozo, Universidad Autonoma de Madrid, *Spain*
Ana Pecharroman, Universidad Autonoma de Madrid, *Spain*

The fundamental aim of this presentation is to show research about the psychology students' skills to read and interpret graphic information. We are interested in analyze the influence of content in these skills. Our previous results (study 1) showed that psychology students were able to read and construct simple graphics but they had problems to reach inferences and make generalizations from graphic data. In the present research we confronted psychology students with real graphics problems extracted from psychology books and papers. In the first condition, the graphic contents are those showed in the psychological books. In the non psychological condition, the graphic contents were about problems related to health. In the study 2, the students had to choose the graphic that better represented the results of experiment and justify their election whereas in the study 3 they had to reach conclusions from data graphic. There were four different problems in each study. The first problem showed categorical data whereas in the other the data showed the results of a variable, the relationships between two variables without interaction and with interaction respectively. Our preliminary results indicate that there are no differences in the tasks with psychological and non psychological content. In general it was easiest to choose the correct graphic than to reach inferences. The graphic which was easier to choose was the one presenting categorical data and the most difficult was the one that presented two variables with interaction. The more common mistakes were to choose a less adequate format of representation (bar or linear) and not recognizing the interactions factors.

Between planning and practice: Toward the implementation of integrative learning in an experimental teachers education program
Edith Tabak, Levinsky College of Education, *Israel*
Ilana Margulin, Levinsky College of Education, *Israel*

This qualitative-interpretive study, framed by Activity-Theory, was conducted in the context of an experimental teacher education program. Its aims are to describe the process of developing an

integrative curriculum by a professional learning community of twenty-five teacher-educators, and to investigate how they managed the issues which obstructed the process: (a) The curricular issue; (b) The relationship issue: (c) The issue of the gap between creation and implementation. The data, which was collected during four academic years, consists of transcriptions of the teacher-educators' weekly meetings, assignments, student-teachers' written works, participant observations of the student-teachers' teaching and student-teachers' presentations. The data-analysis consists of retrospective identification of research cycles and themes, through a dialectical process with the Activity-Theory (Engestrom 1999; Edwards, 2000). The validation process included triangulation of the various data sources and collaborative interpretation of the data. The research was comprised of three cycles: The first cycle describes the initial stages of developing a professional community of teacher-educators. The disagreement concerning the teaching of the "observation" tool, led to mutual understanding and willingness to build an integrative curriculum which will maintain the essence of the various disciplines and encourage significant connections between them. The second cycle describes the process of developing an integrative modular curriculum. This process encouraged a dialogue between different world views and pedagogical conceptions of the teacher-educators, constructed the frame of the program and determined its boundaries. The third cycle describes the process of work together on tools which encouraged and assessed integrative learning. A core construct emerging from the data was the notion of "middle-level", in a dual meaning: as a hidden curriculum and as an activist, caring and epistemological team. The significance of this study is in the description of a "middle-up-down" model designed to manage implementation of new pedagogical ideas.

Self-regulatory processes used by preservice teachers to learn how to activate and sustain students' motivation within practicum
Sylvie Frechette, University of Quebec at Trois-Rivieres, *Canada*
Monique Brodeur, University of Quebec at Montreal, *Canada*
Frederic Legault, University of Quebec at Montreal, *Canada*

The study investigated the use of self-regulatory processes by preservice teachers to regulate the way they learn to activate and sustain their students' motivation within practicum. Data was collected from 79 trainees who posted a message describing a motivation problem in electronic discussion forums and from 15 trainees who were prompted to describe in stimulated recall interviews a classroom situation where they learned to activate and sustain their students' motivation. Twelve self-regulatory processes were found in interviews and nine in forums. A detailed description of the processes will be presented. Positive correlations were found among phases of self-regulation, and between the number of different self-regulatory processes used by trainees within forums and the number of motivational practices they proposed. Trainees who used more self-regulatory processes generated more motivational strategies.

CORF: An internet platform for supporting student-teachers in learning by inquiring teaching practices
Ruurd Taconis, Eindhoven School of Education, *Netherlands*
Chris de Jong, Fontys University of Professional Education, *Netherlands*
Sanneke Bolhuis, Fontys University of Professional Education, *Netherlands*

Inquiry learning can be a powerful tool in teacher training. Teachers can improve their teaching and research skills by performing inquiries into their own practice in an action research format (Elliot, 1994). Moreover, they can develop the skills necessary to continuously improve their practice, a competence commonly recognized as required for teachers. The CORF system (in

Dutch: Collective Educational Research Facility) is an internet platform that facilitates student teachers in doing scientifically adequate inquiries induced by problems and questions from practice, their own teaching practice in particular. Data gathering facilities (web-questionnaires, tests and evaluation tools), are tailored to the type of inquiries commonly made by students. Methodological support is integrated in the CORF system. Within the CORF system, student teachers co-operate with experienced teachers as well as researchers in designing, performing and concluding/reporting. These various users all bring to the CORF community their questions, expertise, and their research results. In return, they get: answers, knowledge and support from others. Researchers for instance, may appreciate CORF as a way of efficient data collection, while schools may appreciate the opportunities to get easy access to research capacity that can help them to solve some of the problems emerging in school-practice. In the paper the CORF system is presented and its use is illustrated by case studies of student teachers using the system for problem based inquiry learning in a project shaped according to the cognitive apprenticeship model. Functional aspects of the system are evaluated. The learning result in terms of teaching competencies as well as inquiry skills is evaluated by: a) pre- and post-tests based on the so called 'quick scan' – a commonly Dutch questionnaire on teacher competencies, b) the analysis of the student teachers' regular portfolios, c) a skill-test concerning inquiry skills.

An exploration of the use of video cases for the elicitation of teachers' practical knowledge
Maaike Vervoort, Edith Stein Teacher Education College, *Netherlands*
Ellen van den Berg, Twente University, *Netherlands*

This study focuses on the use of video cases for the elicitation of teachers' practical knowledge. Teachers' practical knowledge is viewed as an amalgam of all teachers' cognitions that influence teaching activities. Having access to the practical knowledge of experienced teachers means that student-teachers have access to the cognitions underlying teaching that can help them to connect a formal body of knowledge with their teaching practice. In a multiple-case study three steps of analysis were used to combine the data of professional dialogues, in which experienced and prospective teachers discuss video cases of exemplary practices, and interviews with the student-teachers. The content analysis of the professional dialogues showed that when discussing the video cases mentor teachers reflect on various aspects of their practical knowledge, especially knowledge about individual students, knowledge about the curriculum and knowledge about subject matter. We also found that student-teachers valued the professional dialogue as an instrument that supports the practice of innovative teaching and leads to a deeper insight into the relationship between formal knowledge, practical knowledge and teaching. It was concluded that the use of video cases stimulates the elicitation of mentor teachers' practical knowledge and that student-teachers can use this knowledge productively. Video cases of exemplary practices used in teacher education could add to the coherence of the teacher education curriculum.

How is teaching guided and uncovered by phronesis?
Husu Jukka, University of Helsinki, *Finland*

The purpose of this study is to explore day-to-day details of teachers' pedagogical encounters to see what they might offer in putting forth an understanding of teachers' pedagogical knowledge. This study uses the concept of phronesis as its starting point and concentrates on three interpretations of the concept and their educational applications: the rationality code, the situational code, and the moral character code. Theoretical analysis is illustrated with data from 80 written case reports of pedagogical situations experienced by Finnish primary school teachers. The process of analyzing and interpreting the data through different codes of phronesis provides a

forum for comparing the similarities and differences in the findings that emerge from the three theoretical perspectives. The paper emphasizes that the use of more than one theoretical and practical approach will expand and complement our understanding of teachers' professional knowledge in action. It may help us better understand the problems teachers face in their work; the dynamics of educational contexts; and value the impact of different approaches on teachers and students.

Argumentation in Physics classes focusing on the teacher
Marina Castells, Universität de Barcelona, *Spain*
Josep M. Cervero, Universität de Barcelona, *Spain*

The study we present here focuses on the argumentation teachers use in their explanations of scientific concepts interacting with students in Physics Education's classes. The framework is based on Perelman's Theory of Argumentation that integrates argumentative elements with rhetorical ones; this theory is complemented with some elements of the Topics and Rhetoric of Aristotle, mainly the topics of his Dialectics and his Rhetoric. We justify the use of this framework for the analysis because it focuses on plausible reasoning and because it considers communicative aspects, as the consideration and adaptation to the audience (in the form and in the content), integrated with argumentation, that is not formal. We illustrate the analysis done and comment some of the findings to confirm the adequacy of the chosen theoretical framework. Conclusions and implications for science education are also commented

The effect of debate training on argumentative skills: The developmental process of Japanese College students
Mika Nakano, Kyushu University, *Japan*
Shun'ichi Maruno, Kyushu University, *Japan*

How do students acquire argumentative skills by debating? Although this question has long been attempted to answer in various ways, a common limitation of the previous studies is the tendency to ignore the potentials of students who learn debating for the first time and those of ESL/EFL debaters. This presentation aims at proposing a process model of acquiring argumentative skills which was brought out by a short-term experiment using a "Parliamentary Debate" format conducted for Japanese college students. The main points of the findings were: (1) all participants improved their argumentative skills, (2) a developmental process of reasoning was found, and (3) the most difficult stage for Japanese learners was revealed. For pedagogical implication, to teach debate to Japanese students who are especially unwilling to debate, we need to have them realize their improvement with confidence by reducing their mental blocks. By discussing their developmental stages of subordinate skills and argumentative patterns, the future prospects of argumentative education for Japanese students will be further explored.

H7
30 August 2007 11:00 - 12:20
Room: PP7
Poster Session

Poster session

Chair: **Krisztián Józsa,** University of Szeged, *Hungary*

A survey on emotions, attitudes, and beliefs in mathematical problem solving
Giorgos Georgiou, University of Cyprus, *Cyprus*
Eleftheria Charalambous, University of Cyprus, *Cyprus*
Michalis P. Michaelides, Cyprus College, *Cyprus*
George Philippou, University of Cyprus, *Cyprus*

A survey was conducted to investigate the emotions, attitudes, and beliefs of 5th- and 6th-graders in the context of mathematical problem solving. The study was carried out in elementary schools in Cyprus using a 34-item questionnaire and a sample size of 277 students. Findings revealed high levels of self-efficacy beliefs, pleasure, and control, and low levels of phobia and anxiety during problem solving tasks. Well-known conceptions on mathematical problem solving, such as "only clever students can solve mathematical problems", "learning mathematics is mostly memorization" and "a mathematical problem must be solved in 10 minutes or less otherwise it cannot be solved" were confirmed. The participants on average expressed disagreement to the commonly held belief that "mathematics problems have only one solution". The subscales measuring emotions and attitudes – self-efficacy, phobia-anxiety, pleasure, control and problem type preferences – were run through factor analysis. All five subscales were all positively correlated with each other to a medium to high degree. No gender or grade differences on the subscales were identified apart from a difference on self-efficacy in favor of 5th-graders. This study demonstrates some descriptive findings about various affective factors, which in turn influence mathematical problem solving. We propose that other methodologies must be employed in future studies on this topic.

School and classrooms effects on students' motivation and engagement
Carole Vezeau, Cegep Regional de Lanaudiere a Joliette, *Canada*
Roch Chouinard, Universite de Montreal, *Canada*
Julie Bergeron, Universite de Montreal, *Canada*
Therese Bouffard, Universite du Quebec a Montreal, *Canada*
Michel Jánosz, Universite de Montreal, *Canada*

Research on school effects try to determine how the enrolment in a particular school or a particular classroom makes a difference in the success of students, beyond their personal and social characteristics. Results on the school effect with regards to academic achievement show variation between different countries (from 1% to 20% of explained variance), presumably due to differences in the systems of education. However, there is a general consensus that classroom effects outweigh school effects. An issue that remains unclear is whether schools and classrooms have as much influence on motivational variables as on achievement. The aim of the present study was to document the school- and the classroom-effect on the motivational profile, engagement and academic achievement of students from the province of Quéêbec (Canada). Total sample includes 3645 high school students (aged from 12 to 17 years old) nested in 175 classrooms (92 in Language Arts and 83 in Mathematics) from 24 schools. The data were analyzed using

hierarchical linear modeling (HLM) techniques. Results indicated that 7.2 % or less of the variability in the motivational variables was between classrooms whereas variation between schools never account for more than 3.2% of the variance. For academic achievement, variation between classrooms is much stronger than on motivational variables. Findings of these studies suggest that differences in motivation are more related to the individual characteristics than to schools or classrooms characteristics. This does not imply that schools or classrooms have no impact but that they presumably use similar practices or interventions

Simulation-based e-learning to support learning at work
Virpi Slotte, WSOYpro, *Finland*
Päivi Tynjälä, University of Jyväskylä, *Finland*

Simulations provide a possibility to solve real-world problems through work-related scenarios. The purpose of the present study is to examine simulation-based, work-related e-learning from the learners' point of view. Data were produced from 124 sales personnel of the company who responded to the questionnaires in 2006. Quantitative and qualitative methods were used to provide a comprehensive understanding of the learners' experiences of the use of the simulation-based course. The results showed that majority of the participants regarded the simulation as a positive way of improving the customer service skills. We argue that the reasons for a high rate of positive participant responses are attributable to the proper opportunity to integrate learning with practice. The work has relevance for corporate training providers considering incorporating learning tasks so that learners can examine their work in the light of the conceptual tools provided.

Probabilistic thinking
Dóra Nagy, University of Szeged, *Hungary*

Problem raising We look out the window and, seeing the dark clouds, we postpone the excursion planned for the day. The reason: it is highly likely that, based on our experience, after the appearance of the dark clouds, there will be rain. Such thought form is called probability and correlative thinking Aim: The main aim of the research was to determine the level and the development of probabilistic thinking of high school students. Method The tool of the research was a worksheet with seven open-ended exercises on it. The worksheet consisted of tasks from well-known, international and new self-made exercises. It makes possible to compare our statements with the international results. Results: We used different statistical and qualitative analysing methods. In most of the cases our results proved the statements of previous researches. Initially, probabilistic thinking is in strong relationship with correlative thinking.

Integrating literature with visual art: Textbook design reflecting official curricular goals
Yael Poyas, University of Haifa, *Israel*
Billie Eilam, University of Haifa, *Israel*

Relations between literature textbooks' literary artwork (LAW) and its accompanying visual artwork (VAW) were examined in light of curricular goals. This study constituted new terrain, differing substantially from previously studied text-image relations in learning materials. Although these unique relations between LAWs and VAWs were investigated from a philosophical-artistic perspective they were hardly investigated in the school curriculum context. The study objectives were: (a) to analyze the general features and organization of the learning materials, including instructional support to LAWs, VAWs, and LAW-VAW relations; (b) to analyze and characterize the attributes of each of the selected LAWs and VAWs, in light of the curriculum's official goals

and developers' stated intentions; and (c) to reveal the various kinds of LAW-VAW relations, in light of the curriculum's official goals and developers' stated intentions. We analyzed textbooks which are replete with visual artworks (VAWs) and teacher guides for Grades 7-9. A complete artwork, literary or visual, served as a unit of analysis. The qualitative and quantitative analysis included: (i) general physical characteristics and organization; (ii) analysis of each separate LAW and VAW via categorization of their features using a predetermined set of eight criteria, and (iii) analysis of LAW-VAW relations, using a new set of criteria elicited from the previous step. Inter-rater reliability for the two sets of criteria was tested on a random sample of LAWs and VAWs. We also questioned in writing two of the materials' developers. Findings revealed that despite textbooks' visual attractiveness, students enjoyed relatively low mindful exposure to rich LAW-VAW relations. LAW-VAW adjacency was mostly intuitive and not research-based, and VAWs intended to accompany LAWs were not chosen by application of the same criteria as those utilized for choosing LAWs, thus hindering artistic text-visual relations from achieving its optimal gains regarding literature teaching and learning.

Making connections: The nature and occurrence of links in literacy teaching and learning
Judy Parr, University of Auckland, *New Zealand*
Stuart McNaughton, University of Auckland, *New Zealand*
Meaola Amituanai-Toloa, University of Auckland, *New Zealand*
Shelley MacDonald, University of Auckland, *New Zealand*
Mei Kuin Lai, University of Auckland, *New Zealand*

This paper presents and discusses a conceptual framework for analyzing the nature of links, principally reading-writing links that might be made in literacy learning settings. There are sound theoretical reasons why writing and reading would be mutually supportive in learning, including notions of revisiting, generalization and transfer. Linking reading and writing should enhance learners' awareness of how language works; of the processes of reading and writing, activities and goals and the current and needed expertise. It should build and refine the learners' knowledge base and increase the effectiveness of strategy use. The framework for examining links encompasses both the sites and the types of the connection. The framework has utility both for research and for supporting teachers to develop these links in order to assist generalisability of learning from one to the other. The utility of the framework is examined using observations and the associated transcripts from a large corpus of literacy lessons at elementary level. This provides an indication of normative practice and provides important information for professional learning settings.

Challenges of e-learning in adult foreign language education - Profiling adult students and a teacher in tertiary vocational education
Mirjamaija Mikkila-Erdmann, University of Turku, *Finland*
Minna Scheinin, Turku University of Applied Sciences, *Finland*

The target of this study is to contribute to the understanding of adult language learners, who are studying English language for professional purposes in an E-learning setting. Computer-supported language learning has long traditions. However, the network-based environments for learning purposes still wait to be fully exploited. We focus on adult language learners and the challenges and constraints they meet on network-based environments. The theoretical framework for this study comes from learning research and the task-based approach in foreign language learning. The participants of this study were 18 adult learners of professional English. We applied pre – and post – instructional questionnaires and interviews. During the course the students wrote their learning diaries, which gave us insight into their learning processes. Our preliminary results indicate that

the adult learners have positive attitude towards network-based language studies regardless of poor technical skills. Implications of learner autonomy can also be discerned. In network-based learning environments also the teachers meet new challenges, as they become designers of learning environments rather than transmitters of knowledge. Designing a web-course requires of teacher both good technical skills and understanding of what kind of actions may take place on the net.

Developing scientific concepts in Mathematics in elementary school
Hayuta Regev, Levinsky College of Education, *Israel*
Edith Tabak, Levinsky College of Education, *Israel*

The aims of this qualitative-descriptive study conducted in the context of a partnership between an Elementary School and a College of Education, are to describe the formation of mathematical–scientific concepts by student-teachers, teachers, the methods-supervisor and pupils, and to identify the factors which obstruct this process. The study is framed by Vigotzky's distinction between spontaneous and scientific concepts, and the role played by the teacher in mediating the process of developing mathematical–scientific concepts (Karpov, 2003). The participants were 30 student-teachers, their methods-supervisor, 10 teachers and 100 pupils. The data was collected during one academic year from different sources, and consisted of participant observations and interviews. The data analysis was conducted in a dialectical process between the empirical data, the lexical concept and the mathematical-scientific concept of "sequential number". A content analysis of the participants' answers and their explanations to the question "what number is sequential to a quarter?" enable the identification of three groups of responses: The first group was characterized by lacking awareness of the scientific concept and a strong emphasis on the daily use of the concept. The second group made an analogy to a more familiar system of numbers and an extrapolation to any group of numbers. The third group shows a good understanding of the scientific concept. The main finding is that the factor which obstructs the formation of mathematical–scientific concepts is the tendency to forget the mathematical–formal argument, which is not yet well grounded, and return to one's intuitive knowledge and spontaneous concepts, while using analogies to familiar mathematical systems. The importance of this study is the description of mediated tools and learning strategies developed by all the participants, which can help students to deal with erroneous analogies and in turn, promote the developing of scientific concepts.

Equivalence and ordering of fractions: a comparative study of Brazilian and Portuguese children
Beatriz Vargas Dorneles, Universidade Federal do Rio Grande do Sul, *Brazil*
Ema Mamede, Universidade do Minho, *Portugal*

The understanding of the concept of fractions is progressive and begins with the informal knowledge that children have before they are systematically taught fractions in school. That initial understanding depends on the context in which the children interact with such concept. Our objective is to compare the understanding of fractions in six- and seven-year-olds in two problem situations: part-whole and quotient situations in two studies. Cross-countries systematic comparisons are necessaries before making generalizations. Two groups of children participated: 80 children, from Braga, Portugal, and 80 children, from Porto Alegre, Brazil. Three types of questions – about equivalence, ordering and naming of fractions - were proposed in part-whole and quotient situations. In order to keep the number of questions posed to each child manageable, a between-participants design was used, with random assignment of children to one of the two problem situations. Both Portuguese and Brazilian children performed significantly better in problems presented in quotient situations. The Portuguese children's overall better performance

might be explained by their longer school education. This fact underlines the infantile education importance to the posterior learning performance of the children.

Illusion of linearity: Effect in multiple-choice problems
Miroslav Rajter, Gfk, *Croatia*
Vesna Vlahovic-Stetic, Faculty of Philosophy, Department of Psychology, *Croatia*
Nina Pavlin-Bernardic, Faculty of Philosophy, Department of Psychology, *Croatia*

The aim of this study was to examine if there is a difference in successfulness of non-linear problems solving between younger and older, male and female students and between a group of students who had an offered linear solution for non-linear problems and a group that was not offered a linear solution. For the requirements of this study three lists of mathematical problems were constructed. Form A contained five non-linear problems, and for every problem five answers were offered. Among these five answers, one was a correct solution; one was incorrect linear solution, while the remaining solutions served to reduce the probability of guessing. Form B was identical to Form A, but a linear solution was not offered in it. Problems in the Form C were classical proportionality problems with five offered solutions. One half of participants were asked to solve forms A and C, and the other half to solve forms B and C. A convenience sample of high school students was examined. The sample consisted of 112 first grade (N=52) and fourth grade students (N=60), 53 girls and 59 boys. There were no differences between participants in the solving of linear problems. The older students were more successful in the solving of non-linear problems than the younger ones. The students in the group without the linear solution were more successful than those who had an offered linear solution. The interaction effect of age and solving situation showed that older students were somewhat better than younger students when a linear solution was offered, but that difference was even larger when a linear solution was not offered. The results suggest that methods of education should be re-examined if we want the students to learn different models that can be applied successfully in the school and real-life situations.

Studying the fidelity of implementation of tasks in classroom settings: High-level mathematics tasks embedded in 'real-life' contexts
Gabriel Stylianides, University of Pittsburgh, *USA*
Andreas Stylianides, University of Oxford, *United Kingdom*

Despite the increased attention to 'real-life' mathematics tasks and also the importance of faithful implementation of high-level mathematics tasks for improved student outcomes, little research has examined the factors that may influence the fidelity of implementation of the special category of high-level mathematics tasks that are embedded in real-life contexts. In this paper, we take a step toward addressing this need for research. First, we propose an analytic framework for describing and explaining the fidelity of implementation of different kinds of tasks (not necessarily high-level or mathematical) in classroom settings. Then, we use this framework to analyse the decline in the cognitive demands of a high-level, real-life mathematics task in the seventh-grade classroom of an experienced teacher, receiver of a prestigious teaching award. Our analysis shows that the decline in the cognitive demands of the task resulted from the interaction, during the implementation phase of the task, between main features of the task (namely, its motivational aspects and its high cognitive demands) and the social practices that regulated the functioning of knowledge in the classroom. Finally, we discuss the significance of the analytic framework and of our findings for theory and educational practice.

H8
30 August 2007 11:00 - 12:20
Room: PP8
Poster Session

Poster session

Chair: **Marcel V. J. Veenman,** Leiden University, *Netherlands*

General instructional beliefs and situational beliefs of mathematics teachers
Miriam Leuchter, Teacher Training University of Central Switzerland, *Switzerland*
Christine Pauli, University of Zurich, *Switzerland*
Kurt Reusser, University of Zurich, *Switzerland*
Frank Lipowsky, University of Kassel, *Germany*

Mathematics instruction is required to support the acquisition of routines not only in a teacher-centred and small-stepped manner that emphasises the associationist aspect of learning, but also to stimulate the fostering of a deeper understanding of learning contents in the sense of a constructivist understanding of teaching and learning. The video-based study presented here compares 20 German and 18 Swiss mathematics teachers regarding their belief-system and related instructional actions, and examines links between general pedagogical content beliefs and situational beliefs (based on concrete instructional action). The general pedagogical beliefs focus on the constructivist and the associationist understanding of teaching and learning of the teachers, the situational beliefs on the concrete teaching actions in an instructional unit on the introduction to Pythagorean theorem, also measured by video. In the current study, the German teachers examined rate themselves on the one hand as more constructivist than the Swiss teachers, but by contrast, it was observed that Swiss teachers stimulate the linking of mathematical principles significantly more frequently in their instruction. Based on this finding, the current investigation looks for links between general and situational beliefs. The results indicate that for both the German and Swiss teachers, their general beliefs concerning a constructivist understanding of teaching and learning is hardly reflected in the situational beliefs. Possible explanations for this low correspondence include burdensome general conditions and a low self-efficacy of the teachers. Therefore, in a further step, the links between general instructional beliefs and situational beliefs were examined controlling for these two factors. In line with expectation, several systematic links between constructivist beliefs and situational beliefs were apparent, albeit primarily only in the Swiss teachers.

Teaching practices in science classrooms
Kirsti Klette, University of Oslo, *Norway*
Marianne Odegaard, University of Oslo, *Norway*

The aim of this paper is to illuminate how teachers offer meaningful learning in science. Teaching practices in 6 ninth grade Norwegian science classrooms is videotaped and discussed. As a first step of analyses we have coded video observations of teachers' activities and instructional repertoires. This revealed that in science education whole class instruction is the single most frequent activity. Practical scientific work occurred less than expected. Further analyses focused on how whole class instruction is used in science with special emphasis on the use of scientific language. This disclosed that there is not much emphasis on scientific language and scientific modes of speaking; like seeking explanations with the help of models and theory. The findings are

discussed in light of trends in the international science education research community where there is an emphasis on inquiry based learning and learning to talk science

Development of Web-based Class Observation System for University Teacher Training
Yasuhiro Oyama, Center for the Promotion of Excellence in H. E., *Japan*

In this poster presentation, we report the principal concepts and the interim results of Web-based Class Observation System (W-COS) which is developed to organize online learning community of university teachers. This system enables authorized members to upload videos of their classes so that they can discuss on them with other members utilizing BBS (Bulletin Board System). This system also provides teachers an experience of CSCL (Computer Supported Learning) which cannot be dismissed in the wide spread of ICT (Information Communication Technology) in Higher Education. W-COS is designed to make the best use of proper characters of online to construct a quite new circumstance for Faculty Development. One of the major findings is that this system is very effective for helping teachers to be more reflective on their perspectives, as they can compare and discuss on their cognition and interpretation of shared video clips of class.

Conceptual change beliefs – That is the question. Preservice teachers' beliefs about learning, reading, and writing
Teresa Lewin, Kaye College of Education, *Israel*
Joan Mallart Navarra, Universität de Catalunya, *Spain*

Beliefs about teaching and learning are well-established by the time preservice teachers begin their formal teacher training (Holt-Reynolds, 1992; Pajares, 1992). A major focus of the present study on teachers' beliefs was literacy. Review of the literature suggested two things: there is no consensus, and in fact there is significant disagreement, on theoretical orientations or approaches to reading; and there appear to be two loosely organized but opposing views on reading (and by extension, to literacy in general) (Harlin, 1999; Kagan, 1992). Aims of the study 1. Investigating the initial and final orientations of future teachers toward the instruction and learning of reading and writing; 2. Comparing explicit and declarative beliefs with implicit beliefs of the future teachers in problem-resolution situations; 3. Analyzing possible changes of beliefs and the factors that influenced said changes. In this research, conducted from a qualitative perspective, four preservice teachers were asked to provide accounts of their perceptions and judgments, over a three-year period, about their practice teaching experiences in schools, both with learning and with acquiring literacy (reading and writing). We collected data, narratives, interviews, critical incidents, reflective narratives, and educational simulations. We used concept mapping techniques to follow preservice students' development as learners, as well as their reflective thought. The data collection and data reduction techniques were based on methods most specifically discussed byStrauss and Corbin (1991). Findings suggest that during three years of study in an educational college, practice teaching in schools and curricular intervention, the future teachers broke with beginning teachers' ordinary ways of thinking about children, text, and teaching. This study addresses ways in which educators and mentors might help preservice teachers make connections between their past experiences as learners and their present practice as beginning teachers, between their present experiences and their future complex roles as teachers.

Teachers' beliefs about the nature of accounting and its influence in teaching practices – Findings from a survey and a video-study
Jürgen Seifrid, University of Bamberg, *Germany*
Detlef Sembill, University of Bamberg, *Germany*

The study investigated teachers' belief systems and everyday practices with a special focus on teaching accounting. First the results of a survey with 500 (prospective) teachers of business and human resource management are presented. For a partial sample the reports of the teachers are then contrasted with the perspective of the learners. Furthermore teaching observations are added. The results indicate that the "typical" teaching of bookkeeping is primarily teacher-oriented. According to the interviewees time constraints are one of the drawbacks for a more open way of teaching.

Preschool children and their emotional understanding: effects of age and cognitive factors
Simona De Stasio, University of Movement and Sport Sciences, Roma, *Italy*
Carlo Di Chiacchio, University of Rome La Sapienza, *Italy*
Caterina Fiorilli, University of Milano Bicocca, *Italy*
Ottavia Albanese, University of Milano Bicocca, *Italy*

A substantial body of research has established that emotion understanding develops across childhood between the ages of 18 months and 12 years (Brown and Dunn, 1996; Ruffman, Slade and Crowe, 2002; de Rosnay, Pons, Harris and Morrell, 2004). Several studies have specifically addressed the issue about causal variables that influence development of children's emotion comprehension. In this study we analyze the roles played by language and the nonverbal intellectual dimension in predicting emotion comprehension. Emotion comprehension and cognitive aspects were examined in 103 preschoolers balanced for sex with mean age of 4.27 years . Children were individually tested at: Test of Emotion Comprehension (TEC) (Pons e Harris, 2000), Standard Progressive Matrices (SPM) (Raven, 1968) and the Test for the Reception of Grammar (TROG) (Bishop, 1989).Several hierarchical regressions analyses were performed to analyze the influence of linguistic abilities, intellectual component and age on emotional understanding. Main results found that in each model tested non-verbal cognition became not significant, after having entered age in the equation. The findings suggest that emotion comprehension and its components are mainly explained by language ability and age.

Examination of persistence among American Indian University Students: The roles of cognitive engagement and beliefs
Barbara Greene, University of Oklahoma, *USA*
Teresa DeBacker, University of Oklahoma, *USA*
Robert Mansell, University of Oklahoma, *USA*
Rockey Robbins, University of Oklahoma, *USA*

Data from 88 participants were examined for correlates of persistence among American Indian university students. Potential correlates were meaningful strategy use, belief in one's potential for success in college (self-efficacy); beliefs that learning is knowledge construction; and beliefs that schooling is for the empowerment and/or subjugation of one's culture of origin. Subjugation belief was negatively correlated with persistence. All other correlations were positive. Persistence was predicted by meaningful cognitive engagement, positive beliefs about the self, and negative beliefs about the role of schooling.

The impact of innovative pedagogical measures on school climate and motivational profile of primary school students at risk of dropping out
Julie Bergeron, University of Montreal, *Canada*
Sylvie Gagnon, C.S. de la Seigneurie-Des-Mille-Iles, *Canada*
Roch Chouinard, University of Montreal, *Canada*
Anne Leblond, University of Montreal, *Canada*

The main goal of this study was to verify the impact of an intervention program on student motivation and school climate. The program established for French primary school students at risk of dropping out included a wide range of innovative activities. To verify if the program was effective, we constituted a 60 students control group to which an equivalent participating experimental group was compared. During the two years project, we collected data by a self-reported questionnaire at four different times. A repeated measures analysis was conducted to see the differences between the control and the experimental group through time. The results showed that the program had a strong effect on the participating students regarding their motivation and their perception of the school climate. Only a few factors were not significantly different for the two groups.

Can a mutilation be passed on? Inheritance in Mexican children
Gabriela Villarreal Villafane, National University of Mexico, *Mexico*
Kirareset Barrera Garcia, National University of Mexico, *Mexico*
Rigoberto Leon Sanchez, National University of Mexico, *Mexico*
German Palafox, National University of Mexico, *Mexico*

A study that investigated one aspect of the heritage concept in children; the heritage of the acquired features. In study, 75 children divided in three groups were told stories in which an animal suffer and accident and lose a body member. Subjects were asked if the offspring inherit the acquired feature. The children of the three group showed an inappropriate consideration about the acquired features (the mutilations can be inherited). These data suggest that including children with age 10-11 years old have troubles to determinate if the acquired features can be inherit, this finding refute Carey's argument who said that at 10 years old occurs an important cognitive change within their biological knowledge. In another way these data showed that biological knowledge increases with age, in this sense, it seems that the children have more biological arguments. The findings are discussed in terms of the relevance or depth of the change in the parent could guide the children's notion of inheritance.

Gender differences in students' emotions in primary school
Stephanie Lichtenfeld , University of Munich, *Germany*
Anne C. Frenzel, University of Munich, *Germany*
Reinhard Pekrun , University of Munich, *Germany*

This study focuses on gender differences in mathematics emotions. Even though there are many studies regarding gender differences in mathematics achievement as well as mathematics-related beliefs and appraisals, there is still a lack of knowledge about differences between boys' and girls' in mathematics emotions. This is especially the case in the primary school setting. In this study, we aimed to investigate gender differences in students' mathematics-related competence beliefs and emotions in primary school students. In a study with a representative sample of 687 Bavarian third graders and 677 second graders we examined the differences in girls' and boys' self-reported enjoyment, anxiety and boredom and their competence beliefs in mathematics. Moreover, based

on Pekrun's Control-Value Theory, we hypothesized that gender differences in mathematics emotions are partially mediated by their levels of competence beliefs in mathematics.

Anxiety, motivation, gender and peers in mathematics
Sarah Buckley, University of Melbourne, *Australia*
Mary Ainley, University of Melbourne, *Australia*
Pip Pattison, University of Melbourne, *Australia*

In today's society, it is accepted by peers and the wider community for students to demonstrate negative motivation towards mathematics (Ashcraft, 2002; Wilkins, 2000). This type of culture, in turn, encourages the development of mathematics anxiety. Relationships between mathematics anxiety, motivation and gender were examined in the present project. Anxiety was measured in two ways. Firstly, the more trait-like aspect of mathematics anxiety was measured using traditional questionnaire techniques. Secondly, anxiety was assessed on-task as students completed a mathematics problem via the computer program Between The Lines (BTL; Ainley & Hidi, 2002). Ma (1999) emphasizes the role of social factors in the mathematics classroom. In this project, the role of peer influence was also explored using a network approach. Two hundred and twenty nine Year 8 students (120 girls and 109 boys) participated completing mathematics anxiety, test anxiety, motivation and social network measures. TwoStep cluster analysis revealed three generalised anxiety groups – high, medium and low anxiety. Relationships were found between these groups and levels of motivation. Furthermore, girls (84%) tended to be members of the medium and high anxiety groups while boys (84%) were represented in the low and medium groups. Finally, students in the low and high anxiety groups reported their friends as more and less anxious than themselves, respectively. Analysis of the social network data substantiated these results demonstrating patterns of anxiety and motivation within friendship and status networks. In further stages of this project, sophisticated modelling techniques will be employed to investigate if social relationships have the potential to ameliorate anxiety for the individual student. Findings support theoretical perspectives which emphasize the social context in the development of students' motivation and emotion.

KN2 1
30 August 2007 12:30 - 13:30
Room: Konferencia
Invited Paper

Research on workplace learning: Approaches, findings and challenges

Päivi Tynjälä, University of Jyväskylä, *Finland*

Chair: **Frank Achtenhagen,** University of Gottingen, *Germany*

The presentation reviews research on workplace learning first at a general level and second in terms of students' work-related learning. It is divided into three parts. The first part analyses different research paradigms of workplace learning; the second part presents recent research findings; the last part puts forward challenges for future research. Although the history of research on workplace learning is short, the amount of research has increased enormously during recent years. The relationship between work and learning is a phenomenon that has attracted researchers from a range of disciplines from pedagogical and psychological approaches to organisational studies and management research. This has resulted in diversity of concepts, models and theories. Thus, the concept "learning" refers to processes taking place at different levels, from that of individuals and groups to communities of practice and organisations. The most recent extensions are the notions of network learning and regional learning. Altogether, fundamentally different phenomena have been the foci of workplace learning studies: individual development, knowledge acquisition, participatory processes, organisational and cultural transformation, innovation... The main reasons for this expansion are the rapid change of society and working life during the past few decades as well as transformations in conceptions of learning. Using the participation metaphor to illuminate the nature of learning has been typical although the cognitive paradigm and the acquisition view also are present in research. Furthermore, the increased use of the knowledge creation metaphor suggests that learning at work is increasingly seen as an innovative activity. Although workplace learning differs remarkably from learning in educational contexts there are some similarities between school-based and work-based learning, and in certain respects these different forms of learning are coming closer together. Different models of organising work experience for students as a part of formal education programmes are presented and analysed.

KN2 2

30 August 2007 12:30 - 13:30
Room: Harmónia
Invited Paper

Learning with animations: lessons from static graphics

Richard Lowe, Curtin University of Technology, *Australia*

Chair: **Andrea Kárpáti,** ELTE University Faculty of Science, *Hungary*

Animations increasingly feature in technology-based learning materials. However, the basis upon which much educational animation is designed and used by practitioners tends to be intuitive rather than principled. Consequently, the educational effectiveness of the animations included in these learning materials is uncertain. This presentation explores recent theoretical developments and empirical findings having implications for the design and use of educational animations. Its particular focus is the potential of animations to facilitate comprehension of complex, specialised dynamic subject matter. To date, most research on learning with animations has dealt with relatively simple and familiar subject matter. It has produced a number of principles that are applicable to more straightforward types of animations. However, those principles are not necessarily sufficient for animations that impose greater information processing demands on learners. Dynamic depictions of complex subject matter are especially challenging for learners lacking background knowledge in the depicted domain. Both visuospatial and dynamic characteristics of an animated display can contribute to the complexity responsible for the challenges such learners face. In order to make this high-demand situation tractable, learners must be selective about which aspects of the display receive their attention. Lacking support for top-down processing of the animation, low domain knowledge learners tend to be more reliant on bottom-up approaches when extracting information from this type of display. As a result, their extraction may favour information that is perceptually salient but not necessarily highly relevant to the learning task. Under these circumstances, manipulation of the way information is presented has the potential to make its relevant aspects more accessible. For hundreds of years, approaches that reduce visuospatial realism have been used to make static graphics more educationally effective. With the ascendancy of animations in education, it is appropriate to investigate the use of parallel approaches with dynamic graphics that reduce behavioural realism.

KN2 3
30 August 2007 12:30 - 13:30
Room: Gömb Aula
Invited Paper

What is self-direction in self-directed learning? - state of the art and consequences for the development of learning potentials.

Peter Nenniger, University of Koblenz-Landau, *Germany*

Chair: **Monique Boekaerts,** Leiden University, *Netherlands*

Self-directed or self-regulated learning is already a key-issue in the actual discussion about learning and instruction. Meanwhile there exists a widespread and heterogeneous body of theoretical concepts as well as a large field of research about numerous application areas. For this there is more and more need for a more comprehensive understanding of this phenomenon. With regard to the history of ideas around the autonomous learner and some key-concepts included in the majority of theories about self-directed or self-regulated learning, the question will be raised in this key-note on whether giving higher emphasis in the dynamics of self-directive or self-regulative processes could not emerge as a via regia for a deeper understanding of their core as self-direction or self-regulation in learning as well are a more deliberately and more precisely formed criterion in applicative research about the development of learning potentials.

I 1
30 August 2007 14:30 - 16:30
Room: Harmónia
SIG Invited Symposium

On the dynamic interplay of motivation theory and research methodology

Chair: **Stuart Karabenick,** University of Michigan, *USA*
Organiser: **Marold Wosnitza,** University Koblenz-Landau, RWTH Aachen, *Germany*
Organiser: **Stuart Karabenick,** University of Michigan, *USA*
Discussant: **Anastasia Efklides,** University of Thessaloniki, *Greece*

Presenters in this symposium describe research methods and their associated theoretical frameworks, how new methodology can open new ways to conceptualize phenomena, but may also constrain theoretical developments. Mary Ainley (University of Melbourne, Australia) will illustrate what on-line measurement has to offer when investigating the interconnections between dynamic learning processes. Julianne C. Turner (University of Notre Dame, USA) questions whether survey methodology is ill suited to study the motivation of people in relationships. Pekka Salonen, Marja Vaurus, and Riitta Kinnumen (University of Turku, Finland) describe instruments to tap the complexity of real-life, dynamic and socially embedded human motivation, emotion and learning. And Simone Volet (Murdoch University, Australia) outlines methodological approaches to the study of motivational dynamics within and across socially challenging learning activities. Discussant Anastasia Efklides (University of Thessaloniki, Greece) will share her perspectives on these emerging methodological trends.

Investigating the interconnections between dynamic learning processes: What does on-line measurement offer?
Mary Ainley, University of Melbourne, *Australia*

Interest, efficacy, persistence, deep processing strategies, enjoyment, relief, are all connected with effective learning. They are also among the range of processes that we have been able to measure in relation to students' responses when working on problem tasks. The basic design behind our software was to develop a tool for investigating the role of interest in learning by monitoring and recording students' on-task activity (Ainley & Hidi, 2002). Issues dealing with relationships between interest and other motivational constructs, with how interest processes influence learning and achievement, and with relationships between individual and situational interest are some of the specific questions that guided the software development (Ainley & Ainley, 2006). A major feature of this methodology is the potential for monitoring a wide range of process indicators simultaneously. It is the richness of the data set generated that is both different and complementary to other techniques. In this presentation we will describe something a range of current findings. At the level of a single task the interconnectedness of specific task variables have been modeled. Interest, efficacy, difficulty, affect, strategic processing in note-taking behavior, and the quality of performance on the writing tasks are some of the variables we have monitored to examine what is happening when students engage with learning. Expectancy, experience, and reflection form a natural sequence for these analyses. When the same group of students completes a number of related tasks separated in time, patterns of change in on-task processes related to both personal and task factors have been identified. The same basic methodology using grade appropriate problem

tasks has been used with classes from fifth grade through to the senior years of high school. Our findings confirm interest is one of the important threads binding person, task and context to produce effective learning.

Returning to our roots: Reclaiming the "social" in motivation research
Julianne C. Turner, University of Notre Dame, *USA*

How does motivation develop and why does it change? These questions are both theoretically and practically important. At the turn of the century Dewey declared that psychology was, by dint of its study of human beings, fundamentally social. He proposed a "dual aspect" theory, in which the "social" and the "cognitive" are studied as integral parts of a single phenomenon. Since then, social cognitive motivation research has developed its "cognitive" focus while neglecting or subsuming its "social" and situational aspects. Current motivation research examines social aspects of experience primarily through the cognitions of respondents, using mostly survey methodology. This approach is ill-suited to explaining development and change because it ignores their sources while implying that respondents have conscious access to beliefs and that beliefs are fairly stable. The question "why" should be answered with the study of people in relationships (Gergen, 1985) Rogoff (1995) offers one theoretical approach which could be adapted to explain the situated and developmental nature of motivation in social and historical contexts. It uses the heuristic of analyzing activity simultaneously on three planes. The personal plane focuses on how individuals change through their participation in an activity. The interpersonal plane focuses on the ways in which activities (and materials) are communicated and coordinated among individuals and how they facilitate or hinder certain types of participation. The community plane focuses on institutional practices and cultural values which have developed over time. While not prescriptive about methodology, approaches similar to these can help us understand the social source of motivation and the holistic nature of the social and the cognitive over time.

Motivation and emotion in context challenging research methodologies
Pekka Salonen, University of Turku, *Finland*
Marja Vauras, University of Turku, *Finland*
Riitta Kinnunen, University of Turku, *Finland*

Current discussions and empirical evidence on developmental, learning-related interactions between cognitive and metacognitive competence, motivation, emotion and social interaction has ever more put the social interaction in a spotlight in understanding the power of instruction and in designing new pedagogical cultures. In order to understand individuals' complex long-term and socially embedded development, behavior and behavioral outcomes, researchers are challenged to reassess and refine the current methodologies. Conventional methodological approaches addressing "static", unidirectional or linear relationships between isolated variables cannot provide sufficient basis for understanding the complexity and bidirectional, non-linear dynamics and cumulative processes of behavior-in-context. In particular, when the ultimate goal is to reconstruct learning environments to fit all learners, and to help modify social, learning-related interactions among participants, methodologies that help us to gain a more holistic understanding on motivation in learning is a necessity. In this presentation, we discuss the need and qualitative features of multi-method research approaches, which include instruments to tap the complexity of real-life, dynamic and socially embedded human motivation, emotion and learning. It serves integrative and context-driven theoretical views putting learning into a wider context of adaptation and functional relationships. Rigorous multi-method approach can help us to understand the learner as a whole-person-in-context, i.e., as a person with learning processes and outcomes

strongly dependent not only on cognitive and metacognitive skills but also on socio-emotional goals, motivations and coping tendencies interacting with the affordances and constraints of the learning environments. The use and value of multi-method approach in interpreting motivation and emotion is demonstrated with a case of a female student. Finally, we briefly discuss the promise of new methodologies and digital technologies, which may importantly widen our possibilities for in-depth analyses of real-life motivation and emotion.

Studying motivational dynamics within and across socially challenging learning activities: Grappling with methodological implications
Simone Volet, Murdoch University, *Australia*

The shift towards conceptualizing motivation as dynamic, social and situated has created major methodological challenges for researchers in learning and instruction. Studies of motivation in real-life, dynamic and interactive learning environments have provided empirical evidence that motivated engagement can change in form and intensity over the duration of an activity. Depending on the theoretical perspective, evidence of change as the activity unfolds can be explained as adaptive self-regulation in context (socio-cognitive) or alternatively in relation to emerging new affordances and constraints for participation (sociocultural). Since group members represent each other's social learning environment, it is argued that motivational dynamics should be examined at both individual and group level, and should also take into account broader historical and sociocultural personal and contextual aspects. Furthermore, a focus on motivational dynamics requires the examination of how changing contexts reciprocally shape individual adaptation. This raises a number of conceptual questions with methodological implications. For example, what patterns of motivational dynamics can be identified within and across socially challenging learning situations, and what research methodologies are best suited to identify and explain such patterns? The presentation will discuss some methodological challenges in the study of motivational dynamics within and across socially challenging learning activities with reference to a set of empirical studies that combine longitudinal and multiple contexts research designs.

I 2
30 August 2007 14:30 - 16:30
Room: 0.83 Eötvös
SIG Invited Symposium

From phenomenography to variation theory

Chair: **Mona Holmqvist,** Kristianstad University, *Sweden*
Organiser: **Ming Fai Pang,** The University of Hong Kong, *Hong Kong*
Organiser: **Mona Holmqvist,** Kristianstad University, *Sweden*
Discussant: **Yrjö Engeström,** University of Helsinki, *Finland*

The phenomenographic movement began by investigating students' differences in learning and variation in people's ways of experiencing. This led to the "new" phenomenography, whose aim was to characterise particular ways of experiencing with the use of the theory of variation. Recently, this theory has been extended todescribe and analyse classroom teaching, as well as to design learning environments which create specific patterns of variation in order to bring about learning. This symposium aims at documenting and deliberating the various developments of

phenomenography and variation theory since its inception. A number of phenomenographers who come from different parts of the world and who have joined this research tradition at different points of time are invited to share their understandings of the theme. Contributions to the symposium include: Ference Marton, Gßteborg University, Sweden & Ming Fai Pang, The University of Hong Kong, Hong Kong, "Two faces of variation revisited"; Lennart Svensson, Lund University, Sweden, "A contextual understanding of educational phenomena"; Ulla Runesson, Gßteborg University, Sweden, "The stepwise unlocking of meanings: Constitution of meaning of algebraic expressions seen from the point of view of variation"; and Gerlese Åkerlind, The Australian National University, Australia, "Using phenomenographic research and variation theory to design a postgraduate award course for university teachers". We have invited Yrjß Engestrßm, University of Helsinki, Finland to be the discussant of this symposium to provide feedbacks and comments to the papers presented.

Two faces of variation revisited
Ference Marton, Göteborg University, *Sweden*
Ming Fai Pang, The University of Hong Kong, *Hong Kong*

Eight years ago we presented a paper arguing for the continuity between "Traditional Phenomenography" and what we labelled "The New Phenomenography"(Marton and Pang, 1999). The theme of the paper was further elaborated by Pang (2003). We argued that an interest in variation is the thread that runs through the phenomenographic movement. To understand how the "New Phenomenography" emerged, we must recognize the different senses of variation that have drawn attention at different times. Phenomenography set out to reveal the different ways in which people experience the same phenomena. This "first face of variation" refers to the variation in ways of seeing something, as experienced and described by the researchers. New phenomenography shifts the primary focus from methodological to theoretical questions, and characterizes a way of experiencing something in terms of the critical aspects of the phenomenon as discerned by the learners. However, learners can only discern a particular aspect when they experience variation in that aspect. This is the "second face of variation" which is experienced by the learners but described by the researchers. In our presentation we are going to develop this line of reasoning further by demonstrating the commensurability of our descriptions of the two kinds of variation mentioned.

A contextual understanding of educational phenomena
Lennart Svensson, Lund University, *Sweden*

In this paper some general characteristics of a contextual understanding of educational phenomena are outlined. The outline is suggested against the background of previous phenomenographic research and a recent interdisciplinary phenomenographic project on university physics students' use of language in expressing their understanding of cases of physical motion. The theoretical approach suggested is presented in contrast to some main characteristics of cognitive and socio-cultural theories often referred to in educational research but found to be limited in their focus mainly on cognitive and socio-cultural phenomena and not on educational phenomena. It is suggested that to understand educational phenomena one has to consider the immediate situational context and broader cognitive and socio-cultural contexts based on seeing the learner as an agent mediating the relation to and significance of the contexts. An agent perspective and an intentional expressive view on language use seems to be essential for a contextual understanding in education.

The stepwise unlocking of meanings: Constitution of meaning of algebraic expressions seen from the point of view of variation
Ulla Runesson, Göteborg University, *Sweden*

This paper describes learning on two levels – students' learning and teachers' learning – as a parallel process. A group of teachers worked collaboratively in a Learning study (Pang & Marton, 2005). The aim was to develop their teaching in a way that improved students' learning. A Learning study involves teachers and researchers working co-operatively as partners in an iterative process, gathering data about teaching and pupils' learning, analysing the data, planning and revising. It is demonstrated how the teachers successively developed their teaching in a way that unfolded the complexity of an algebraic expressions. This was a result of a successive opening of dimensions of variation in the interaction between the teachers in the learning study group as well in the interaction in the classroom. The aim of the paper is to demonstrate how meaning is constituted in a dynamic process of the opening of dimensions of variation. Pang, M. F., & Marton, F. (2005). Learning theory as teaching resource: Enhancing students' understanding of economic concepts. Instructional Science, 33, 159-191.

Using phenomenographic research and Variation Theory to design a postgraduate award course for university teachers
Gerlese Akerlind, The Australian National University, *Australia*

Traditionally, Phenomenography has been best known as an empirical research approach for investigating variation in conceptions of different educational phenomena -- including learning, teaching, and particular disciplinary concepts, such as price in economics and motion in physics. It is less well-known for its theoretical basis, in terms of its epistemological and ontological claims (Marton and Booth, 1997), and the Variation Theory of learning that has developed out of phenomenographic research and theory (Marton and Tsui, 2004). This paper discusses what 'conception' and 'conceptual development' mean from a phenomenographic perspective, and how phenomenographic epistemology and its associated Variation Theory of learning can be combined with empirical research on academics' conceptions of teaching to inform the design of a postgraduate award course for university teachers, aimed at encouraging conceptual development in participants' understanding of the nature of teaching and learning. The course design described is informed by phenomenographic research that highlights more and less sophisticated conceptions of university teaching and learning, and the key dimensions distinguishing these different conceptions (Dall'Alba, 1991; Martin & Balla, 1991; Martin and Ramsden, 1992; Åkerlind and Jenkins, 1998; Prosser & Trigwell, ch. 7, 1999; Wood, 2000; Åkerlind, 2003; 2004). Approaches to the conceptual development of course participants are then described in terms of Variation Theory's strategies of contrast, generalisation, separation and fusion (Marton et al, 2004). This paper illustrates the practical implications of Phenomenography and Variation Theory for curriculum design aimed at developing academics' conceptual understanding of the nature of teaching and learning. Course assessment based on participants' self-reflective analysis of their approach to teaching in a defined setting, undertaken at both the beginning and end of the course, provides data that indicates the success of the course design in encouraging the desired conceptual development.

I 3
30 August 2007 14:30 - 16:30
Room: 0.87 Marx
SIG Invited Symposium

Work learning and subjectivity

Chair: **Frank Achtenhagen,** University of Göttingen, *Germany*
Chair: **Anneli Eteläpelto,** University of Jyvaska, *Finland*
Organiser: **Frank Achtenhagen,** University of Göttingen, *Germany*
Organiser: **Anneli Eteläpelto,** University of Jyväskylä, *Finland*
Discussant: **Karin Jensen,** University of Oslo, *Norway*

Challenges in the fields of economy and policy are changing workplace conditions. These changes cause heavy consequences for the individual worker and employee and their perception of these challenges, their attributions as consequences and their resulting actions and behaviour. The contributions to this symposium highlight different important aspects of acting and learning at the workplace. Collin and colleagues start with the hypothesis that consequences of these "megatrends" lead to constraints and restrictions on learning at work. They identify by different empirical studies lacks of time and human resources and not sufficiently communicated organisational reforms as main factors restricting learning itself. These results mark starting points for changes of workplace learning. The work of Weber and Arends can be related to these challenges and their consequences at work. If these conditions are perceived as restricted workers and employees should be able to "adjust" to these changed working conditions. They discuss the model of Selective Optimization with Compensation as a major means to overcome limits of the development of identity and vocational self-competence. Billett tries to unfold subjectivities at work by identifying individual dispositions as interest, preferences and values. He hypothesises that such dispositions influence definitively thinking, acting, and learning. By an integration of ethnographic-type and problem-solving studies he tries to explain the interdependence between personal preconditions and social impact at the workplace. Like the other projects he also focuses on the importance of ongoing accumulative developmental processes. Gruber and colleagues investigate factors which might influence learning at the workplace. They identify the quality of informal feedback as one decisive predictor for initiating workplace learning processes. All contributions to this symposium focus on the interplay of personal factors and subjectively perceived (changing) conditions for the workplace and give first hints for viable solutions with regard to overcoming its constraints.

Constraints and challenges of learning and construction of vocational and professional identities at work
Kaija Collin, University of Jyväskylä, *Finland*
Susanne Paloniemi, University of Jyväskylä, *Finland*
Anne Virtanen, University of Jyväskylä, *Finland*
Anneli Eteläpelto, University of Jyväskylä, *Finland*

Although the importance of analysing workplace learning from various perspectives has been widely recognised, the constraints and restrictions of learning at work have not so far been investigated in detail. This paper analyses and discusses different constraints and restrictions of workplace learning and vocational development in various workplace learning contexts. The question of how the construction of vocational identity may be challenged by these constraints is

also considered. Both the individual and social levels are examined. The constraints of learning are approached from three perspectives: i) authentic learning experiences of employees from various sectors, ii) professional development and identity negotiations of employees aged 40+ from various work contexts and iii) vocational learning among young adults' in the workplace. We ask how the learning and development of vocational identities are related to the various learning constraints and restrictions present in the socio-cultural contexts of the workplace. The study utilizes a diversity of empirical data collected in Finland. Interviews were conducted in an industrial design company and in various carpenters' workplaces. Also office and nursing staff were interviewed. Altogether 70 employees were interviewed. Various qualitative methods were used in analysing the interview data. The data on the young adults in their workplace learning contexts was collected with Internet questionnaires (N = 1071). These vocational education students represented six fields of vocational education and training. The results showed that in most fields/vocations/professions lack of time and human resources in the workplace were most serious factors restricting learning. Also, organisational reforms were perceived by workers to be very challenging and dilemmatic. Vocational students' experiences of the most restrictive factors validate the picture by demonstrating that the shortage of student guidance in the workplace seems to cause the most serious limitations on learning among the younger workers.

The model of selective optimization with compensation as a basis for measuring self-competence in the domain of business and commerce
Susanne Weber, University of Munich, *Germany*
Lena Arends, University of Göttingen, *Germany*

In current policy debates, one of the major concerns refers to the question whether education and training systems are able to equip young people with the ability to "adjust" to changes in organisational structures, work processes, and technology. Increasing economic internationalisation as well as political and social standardisation in Europe has placed a range of demands upon vocational education and training with regard to efficiency, coherence, and flexibility. In the domain of work, individuals are expected to be adaptive, innovative, and self-directed. In this regard, recent international assessment programmes of students' and adults' competencies (e.g., PISA, ALL) provide an important tool for policy decisions. In vocational and occupational education and training comparable concepts are completely missing. The paper presents a life-span approach for conceptualising vocational self-competence, arguing that individual strategies of successful life management are one of the essential prerequisites to successfully meet the challenges in today's work environments. The central domain of self-competence is linked to the model of Selective Optimization with Compensation (SOC) from life-span psychology (e.g., Baltes & Baltes, 1990). Based on a comparison of two German apprenticeship programmes it can be demonstrated how SOC-strategies in VET are being developed in young adulthood. This provides a basis for understanding and explaining aspects of vocational self-competence from a developmental perspective in the domain of business and commerce.

Subjectivities at work: the potency of disposition
Stephen Billett, Griffith University, *Australia*

Understanding what motivates and directs human cognition and how this is shaped by and shapes relations with the social world remain a key concern for learning theorists (e.g. Silven 2002). Here, the role of individual subjectivities in the form of dispositions (e.g. interest, preferences and values) is investigated to elaborate the potency of those dispositions in terms of thinking, acting

and learning, and to identify the geneses of these dispositions in individuals' ontogenies. The investigation here comprises an integration of ethnographic-type and problem-solving studies of vocational practitioners. It found that, beyond energising human capacities, the practitioners' subjective dispositions also are central to the constructive process of individual meaning making and the remaking of cultural practices. Moreover, these dispositions were identified as being sourced in individuals' life histories and in ways that emphasise a negotiated interdependence between the personal and the social that represents an ongoing, yet accumulative, process throughout ontogeny.

Quality of informal feedback as predictor of learning at the workplace
Hans Gruber, University of Regensburg, *Germany*
Maria Bedane, University of Regensburg, *Germany*
Helmut Heid, University of Regensburg, *Germany*

In educational science, the interest in analysing learning at the workplace has been increasing for a number of different reasons. Some of these result from assumptions which take a macro perspective, some are based on micro perspective arguments. The macro perspective often incorporates theories from business administration, organisational theory, and human capital theory. Respective arguments focus on changes in society, economy, or on organisational change. For example, the dynamics of the market as well as new technological developments indicate that the banking industry is in transition. The whole class of business has to adapt to new requirements, and it is argued that employees face the challenge of adapting to such changes and thus to learn continually. On the other hand, the micro perspective focuses on how individuals subjectively perceive and react on changes in their immediate workplace environment. For example, individuals perceive changes in daily working tasks and routines, and after more or less deliberate reasoning, they decide whether to engage in problem-solving activities or not. It is not trivial that the need for workplace learning is judged similarly from both perspectives. We present and test a model that allows to predict individuals' activity in workplace learning. The model includes both changes of the workplace on a macro level and aspects of subjective processing. In particular, we argue that the quality of informal feedback subjects receive at their workplace influences their perception of self-determination and, thus, their participation in workplace learning activities.

I 4
30 August 2007 14:30 - 16:30
Room: -1.62
Symposium

Understanding the role of external representations in supporting learning

Chair: **Erica de Vries,** University of Grenoble II, *France*
Organiser: **Erica de Vries,** University of Grenoble II, *France*
Discussant: **Shaaron Ainsworth,** University of Nottingham, *United Kingdom*

There is good empirical evidence to show that the external representations that learners look at and interact with have a strong influence on what they come to understand. However, there is little agreement about why these so called representational effects occur and researchers from different

traditions offer radically different interpretations. For example, explanations in empirical studies on learning with educational representations, depending on the theoretical stance, focus on; effects of attention and motivation (e.g. justifying the use of vivid animations), individual differences in learning style and experience (e.g. visualisers/ verbalisers), instructional design and multimedia principles (e.g. cognitive load explanations) and achieving fluency in a disciplinary discourse (stressing the importance of the affordances and constraints of each particular representation). The purpose of this symposium is to bring together researchers from different traditions (including semiotics, cognitive psychology, cognitive ergonomics and discourse analysis) and who apply different methodological paradigms (e.g. experimental studies, usability engineering, qualitative case study research) to explore whether a synthesis between these approaches is possible or even desirable. Each presenter will expose his or her theoretical approach, describe how it explains a variety of empirical results, report on remaining issues within the approach, and suggest new research that should be undertaken. The discussant will look for points of convergence and divergence between the approaches in order to assess progress towards a genuinely integrative approach, which would be of value to researchers from different traditions and whose application could guide educational practice.

The power of aesthetics in graphics: priming prior knowledge and dictating what is learned
Neil Schwartz, California State University, Chico, *USA*
Helmut Lieb, University of Koblenz, Landau, *Germany*
William Battinich, California State University, Chico, *USA*
Natalie Kiunke, California State University, Chico, *USA*

Graphic representations accompanying text have a reliable influence on the organization and comprehension of the material students learn. The influence occurs with surprising regularity across a wide variety of subject matter and materials—from the standard textbooks used in schools to the graphical interfaces used for navigation on the web. Much of the research on the influence of graphics has been directed at explaining the higher order cognitive processes involved when students use graphics to learn. However, we believe that other properties are at work—particularly aesthetics—that dictate the degree to which graphics influence what students learn. In the present paper we report on the theory, methodology, and results of three investigations that systematically demonstrate the way aesthetic properties of graphics not only influence what students learn from accompanying text, but also prime the learners to retrieve idiosyncratic and affectively rich schemas from prior knowledge. The results from the three experiments provide strong support for the aesthetic property of graphics in arousing memories of learners during learning, and predicting how this level of arousal dictates what they learn.

Cognitive perspectives on learning with external representations
Tina Seufert, Saarland University, *Germany*
Roland Brunken, Saarland University, *Germany*

From a cognitive point of view learning with external representations can be seen as the construction of mental representations of subject topics, which are represented by the external representation. Thus, the question arises how this knowledge construction process works in detail. Currently, there are two prominent models for learning with external representations, which initiated a large amount of empirical work: (1) the cognitive theory of multimedia learning (CTML) and (2) the Cognitive Load Theory (CLT). The CTML focuses on how different external representational formats like texts and pictures which address different sensory modalities are processed on different levels and on describing the resulting knowledge structures. Hence, it gives

a framework for the processes and structures of knowledge acquisition. The CLT on the other hand focuses on the question of how the limited capacity of working memory can be effectively used for these processes. Thus, it is a capacity theory. Beside these different focuses, both theoretical frameworks inspired empirical research, which aims at defining instructional conditions under which the construction of mental representations is effective without overloading learners' limited cognitive capacity. Unfortunately, the results of these studies have often been over-generalized and promoted as "thumb-rules". To avoid these simplifications it is necessary to analyse more detailed the conditions of the learning situation, of the learner him- or herself and to gain deeper insight in the processes of knowledge acquisition on different levels of processing. In the last few years there is increasing interest in all of these three differentiating approaches: (1) by re-analyzing well-known instructional effects under experimentally varied conditions (2) by analyzing interaction effects between learners aptitudes and treatment conditions (ATI-studies) like prior knowledge or spatial abilities and (3) by collecting data within the learning process through thinking aloud protocols or dual task performance data.

Dyadic versus triadic views on representation, how does semiotics fit in?
Erica de Vries, University of Grenoble II, *France*
Jacques Baille, University of Grenoble II, *France*

Recently, in addition to the term "cognitive tools", the term "semiotic tools" has been coined referring to mediating role of the computer in learning. Both terms refer to the affordances of computers for the interpretation, construction, and manipulation of symbolic structures presented on screen. The two terms nevertheless rest on two distinct theoretical perspectives on representations. The prevailing cognitive view can be described as dyadic in two ways: both internal and external representations represent objects and phenomena in the real world. The alternative semiotic view can be described as triadic: upon some sense impression, an idea is evoked in the mind of an individual that corresponds to an entity in the real world. In this contribution, we briefly present both perspectives and examine two implications of introducing the triadic perspective in studies of learning with external representations. The first implication involves taking into account intra-modality variations in external representations, i.e. essentially different ways of representing the same subject matter within a representational category. The second implication involves establishing learners' prior knowledge of existing and emerging representational formats, in addition to prior domain knowledge, in learning research.

Learning from complementary representations: a disciplinary discourse approach
John Airey, University of Kalmar, *Sweden*
Cedric Linder, Uppsala University, *Sweden*

How do representations mediate learning of disciplinary concepts? In this paper we explore student learning in terms of becoming fluent in a disciplinary discourse. We define disciplinary discourse as the complex of representations, tools and activities of a discipline, and discuss how these components are related by a disciplinary order of discourse. In our study, physics undergraduates from two Swedish universities were interviewed about their learning experiences in lectures, using a stimulated recall approach. Since we videoed lectures and took field notes, our data best illustrates the representations aspect of disciplinary discourse, i.e. written and oral text, tables, graphs, diagrams, pictures, equations, computer animations, etc. Naturally, we found instances where students were not 'fluent' in the representations of disciplinary discourse. One example of this can be seen in Fig. 1. Insert figure 1 here Fig. 1. Diagram of a transformer drawn by the lecturer on the whiteboard The majority of students in our study considered this well-known

representation of a transformer to be unproblematic. One student, however, claimed not to have ever understood what was being represented. The student knew the various parts (coils, iron core, currents etc.) but not what the diagram represented as a whole. We also identified situations where students were seemingly 'fluent' in a number of representations, but had still not appropriately experienced the associated disciplinary concept. For example, Maxwell's equations could be used to calculate correct answers but the meaning of these representations was unclear to students. Referring to the phenomenological concepts of appresentation and relevance structure, and the observation that different representations have different affordances, our analysis suggests that fluency in a critical constellation of representations may be a necessary condition for meaningful access to disciplinary concepts. The pedagogical implications of this approach are briefly discussed.

Utility, usability and acceptability: an ergonomic approach to the evaluation of external representations for learning
Andre Tricot, Work and Cognition Laboratory, Univ. of Toulouse, *France*

Since the beginning of information and communication technology, many computer programs for learning were designed and distributed to schools and universities. But sadly, many of them are not used. Consequently, it is both interesting and useful to evaluate and to improve these computer programs before trying to distribute them. Ergonomic approaches attempt to fulfil this type of goal: evaluation in order to improve. But these approaches are very often confused with usability evaluation. Confusing usability approaches and ergonomic approaches can lead to a deadlock. We conducted different studies in the evaluation of computer programs, containing a variety of external representations for learning. These studies show that a designed artefact can be usable but not used, and vice versa. That is the reason why we propose an ergonomic framework where the quality of an artefact is defined by its utility, usability and acceptability. We present data, from different empirical studies, which allow us to say that these three dimensions are equally important and interrelate. We also found that these relationships are not always similar. Then, we defend an inductive approach to the analysis of the relationships between utility, usability and acceptability.

I 5
30 August 2007 14:30 - 16:30
Room: -1.64
Symposium

Exploring the nature of the refutation text effect in conceptual change

Chair: **Suzanne H. Broughton,** University of Nevada, Las Vegas, *USA*
Organiser: **Mirjamaija Mikkila-Erdmann,** University of Turku, *Finland*
Organiser: **Gale M. Sinatra,** University of Nevada, Las Vegas, *USA*
Discussant: **Clark Chinn,** Rutgers University, *USA*
Discussant: **Erno Lehtinen,** University of Turku, *Finland*

Classroom learning typically involves the restructuring of existing knowledge (Mason & Gava, 2005). One instructional tool that has been found to be effective with enriching the potentials of learning is refutational texts. Refutational texts are designed to activate students' prior knowledge by directly stating misconceptions about a topic, refuting those misconceptions, then presenting

the scientific explanation as a plausible alternative (Hynd, 2003). Indeed, a meta-analysis conducted by Guzzetti, Snyder, Glass, and Gamas (1993) found that refutational texts are more effective than expository texts in promoting conceptual change. Researchers have offered possible explanations for the refutational text effect, such as the design of the text itself-- misconceptions are elicited then refuted (Chinn & Brewer, 1993; Hynd, 2003). A second view is that refutational texts include persuasive messages (Dole & Sinatra, 1998; Hynd, 2003). What is missing from these studies is an examination of how and why the refutation text effect occurs. Several international scholars were invited to report empirical research or make a theoretical contribution to exploring the nature of the refutation text effect. In the first presentation, Irini Skopeliti and Stella Vosniadou (University of Athens) look at the nature of the information provided in refutational texts. Next, Lucia Mason and Alessia Schiocchet (University of Padova) examine the effect of individual characteristics on text processing and conceptual change. The third presentation by Suzanne Broughton, Gale Sinatra, and Ralph Reynolds (University of Nevada, Las Vegas, USA) explores the role of attention and background knowledge in processing refutational text information. Finally, Mirjamaija Mikkila-Erdmann, Erkki Anto, and Marjaana Penttinen (University of Turku) use eye-movement methodology to explore text processing and conceptual change. The discussants (Clark Chinn, Rutgers University, Erno Lehtinen, University of Turku) will provide comments on the papers, including insights for future directions for this line of research.

The influence of refutational & categorical information on children's scientific understanding
Irini Skopeliti, University of Athens, *Greece*
Stella Vosniadou, University of Athens, *Greece*

The purpose of the present research was to investigate the influence of refutational text and of categorical information on changing young children's earth concept. The term 'categorical information' is used to refer to information about the category to which the concept 'earth' should belong (e.g., earth is a solar object vs. a physical object). We hypothesized that refutational texts would have a greater effect on children's text comprehension than the non-refutational texts and that the texts giving information about the categorization of the earth as a solar object, would have a greater effect on children's responses than the non-categorical texts. Eighty-four 3rd graders were randomly assigned to one of the four above mentioned text types. An open-ended questionnaire about the earth was used as pre and post-test. The results showed main effects for both refutational and categorical text types. The refutational text with categorical information improved children's responses more than all the other conditions. The results indicate that the effects of refutational texts can be improved by paying more attention to the selection of the right kind of information to refute. It also supports previous findings that the shift from categorizing the earth as a solar object and not as a physical object may be a prerequisite for a full understanding of the scientific model of the earth as a rotating sphere revolving around the sun.

Refutational text, epistemic beliefs and interest: The interplay of instructional and individual characteristics in the process of conceptual change
Lucia Mason, University of Padova, *Italy*

This presentation is aimed at discussing the findings from two studies focused on the interplay of instructional and individual variables to extend our understanding of the complex dynamics underlying the process of knowledge restructuring. Specifically, we examine the role of refutational text in relation to learner epistemic beliefs and interest to try to shed light on why and how the effect of this type of text occurs. The first study involved 110 8th graders and the topic

was natural selection and animal evolution, while the second involved 94 5th graders studying the topic of light and vision. In both studies epistemic beliefs were measured by means of self-reported questionnaires, and students were assigned to two reading conditions. In one condition they read a refutational text, while participants in the other read a traditional text. Within each reading condition students had more or less advanced beliefs about the nature of scientific knowledge. In the second study they also had high or low topic interest. As hypothesized, in the first study greater conceptual change was produced by students who read the refutational text and believed more in complex and uncertain knowledge. In the second study, students who attained the highest scores at both the immediate and delayed post-test were those who read the refutational text and had high topic interest as well as more constructivist beliefs about scientific knowledge. Furthermore, in the first study greater metaconceptual awareness of the change in their conceptions was expressed by students who read the refutational text and those who were more sophisticated in their epistemic thinking. Theoretical and educational implications will be drawn.

Attention allocation, background knowledge and the refutation text effect
Suzanne H. Broughton, University of Nevada, Las Vegas, *USA*
Gale M. Sinatra, University of Nevada, Las Vegas, *USA*
Ralph E. Reynolds, University of Nevada, Las Vegas, *USA*

This study examined the influence of the selective attention strategy (SAS) on reading refutational text. According to the SAS, readers learn important information because they allocate extra attention to certain text elements. Attention allocation may be an indicator of the level of engagement the reader has with the information to be learned and may account for the power of refutational text in promoting conceptual change. Undergraduate college students (N=48) were assigned to read either a refutational or a non-refutational text. Both texts introduce the same topic (seasonal change). Individual participants' reading times were tracked and recorded sentence-by-sentence in order to examine the effects of the SAS on the processing of refutational text and promoting conceptual change. A one-way ANCOVA was conducted to compare reading times between the refutation text group and the non-refutation text group. Reading rate and comprehension were used as the covariate. The results show a significant difference in time spent reading the refutational paragraph [$F(2,45) = 4.86$, pless time processing the refutational text. Both text types showed learning effects with participants in both groups scoring higher on the seasons concept inventory at both the post-test and delayed post-test. These findings illustrate that the refutation effect may be due to the "schema slot" notion that refutational material may be easier to read because it serves as an advance organizer, activates background knowledge, and provides clear, concrete, compelling examples for the reader. A second study to be completed and included in this presentation will extend Study I by interviewing participants after reading the text passages.

Tracing the process of conceptual change in reading science text
Mirjamaija Mikkila-Erdmann, University of Turku, *Finland*
Erkki Anto, University of Turku, *Finland*
Marjaana Penttinen, University of Turku, *Finland*

The purpose of this study is to examine the process of conceptual change while reading science text. Thirty sixth graders read a text concerning photosynthesis. Both eye tracking and video material were used together with written pre- and post-tests. This study showed tendencies that a concept called look from time functions as an indicator of cognitive conflict while reading science text. Thus if the reader experiences cognitive conflict, he might try to solve the problem by leaving the critical part of the text, reading previous text, coming back to the critical part and then

continuing his reading. In this study new methodological and theoretical aspects were tested. This line of study can be beneficial for developing science texts for school purposes. Keywords: cognitive conflict, conceptual change, eye tracking, text comprehension

I 6
30 August 2007 14:30 - 16:30
Room: 7.14
Symposium

Conditions for assessment to enhance learning

Chair: **Mien Segers,** University of Leiden, *Netherlands*
Organiser: **David Gijbels,** University of Antwerp, *Belgium*
Organiser: **Mien Segers,** University of Leiden, *Netherlands*
Discussant: **Sari Lindblom-Ylänne,** University of Helsinki, *Norway*

Today, there is consensus that assessment is one of the most salient contextual variables that has influence on students' approaches to learning and their learning results is (e.g. Crooks & Mahalski, 1985; Ramsden, 1992; Scouller & Prosser, 1994; Thomas & Bain, 1984). However, empirical studies regarding the effects of the learning and assessment environment show that the expected learning outcomes are not always demonstrated (Segers, 1996). Recent research shows that the way the learning and assessment environment is perceived by the students affects to a large extent how students cope with the learning environment and consequently their learning results (Segers & Dochy, 2001). This means that investigating the way the learning and assessment environment is perceived by the students seems to be crucial for interpreting their learning outcomes, both in terms of approaches to learning and study results (Segers, et al., 2003). In this symposium 4 papers will be presented in order to enlarge our understanding of the relationship between students perceptions of the learning and assessment environment and the conditions under which this contributes to the development of deep approaches to learning and better learning results.

Students' perceptions of assessment demands and their approaches to learning in a constructivist learning and assessment environment
David Gijbels, University of Antwerp, *Belgium*
Mien Segers, University of Leiden, *Netherlands*
Elke Struyf, University of Antwerp, *Belgium*

Recent research shows that, as students interpret the demands of the assessment tasks, they vary their study approaches in order to cope with the assessment tasks. Three research questions are central in the present paper: (1)Can a constructivist learning-assessment environment change students' perceptions of assessment demands towards more assessment of deep learning skills? (2) Can a constructivist learning-assessment environment change students' approaches to learning towards a more deep approach? (3) Are students' changes in perceptions of assessment demands related to changes in students' approaches to learning? Students following the course 'Education and psychology' of the teacher training program at the University of Antwerp competed two questionnaires during the first lesson and the final lesson of the course. One to measure their approaches to learning and one to measure their general perceptions of the assessment demands. The course 'Education and psychology can be labeled as a 'constructivist learning environment'

with congruent assessment methods. Results of the paired sampled t-tests indicated that students indeed do change their perceptions of assessment demands towards more assessment of deep learning skills. However, the results also indicated that students did not change their approach to learning towards a more deep approach. On the contrary, students seem to develop more surface approaches to learning during the course. Correlational analyses indicated that only changes of perceptions of assessment demands towards more surface skills are significantly related to changes in approaches to learning, towards a more surface approach to learning. The results point us to the complexity of the relationship between the learning-assessment environment, the students' perceptions of assessment demands, and students' approaches to learning.

Students' perceptions of traditional assessment in relation to their study-results in a constructivist learning environment
Gerard van de Watering, Technische Universiteit Eindhoven, *Netherlands*
David Gijbels, University of Antwerp, *Belgium*
Janine van der Rijt, University of Maastricht, *Netherlands*
Filip Dochy, University of Leuven, *Belgium*

In the present study students' perceptions of assessment are topic of research. Two questions are central in this study: (1) How do students perceive the 'traditional' assessment in the constructivist learning environment (i.e. the cognitive processes assessed in the traditional assessment)? (2) In what way are students' perceptions of assessment related to their assessment results? Students' perceptions of assessment were measured by means of 15 questions from the dimension Cognitive process of the Assessment Preference Inventory, (Birenbaum, 1994). Students' assessment results were measured by means of their final exam, which consisted of both multiple-choice and open-ended questions. The constructivist learning environment used in this study concerned problem-based learning (PBL). 208 first-year Law students following a PBL-course on the topic of public law participated in the study. Results were analysed by means of descriptive statistics for the measures used in the present study and analysis of variance were conducted to probe into the relationships between students' assessment preferences and their study results. Results showed that students perceived their assessment primarily an a measurement consisting of comprehension- and application-based questions that required the drawing of conclusions, problem solving, analysis, interpretation and critical thinking. The measurement was also considered, secondarily, as a measurement of reproduction based questions. Despite this, there was a clear correspondence between the intended level of cognitive processes and the perceived level of processes in the assessment in only 40 % of the cases. Though students with a matching perception scored slightly better on the assessment of outcomes compared to students with a misperception, the differences were marginal and not significant. Additional interviews with students about the assessment revealed some insights in how students identify these questions and how they (do not) cope with it. Several explanations are discussed in the paper.

Students' perceptions of the assessment practice and their approaches to learning in a portfolio assessment context
Mien Segers, University of Leiden, *Netherlands*
David Gijbels, University of Antwerp, *Belgium*
Marieke Thurlings, University of Leiden, *Netherlands*

There is a widespread claim that assessment steers learning. A few empirical studies indicate that students' perceptions of the assessment demands are related to their learning approaches, however not always in the expected direction. In order to gain more insight into the elements of the

assessment practice influencing student learning, we used the Gibbs & colleagues framework. We focused on students' perceptions of the amount and distribution of effort, assessment and learning, quantity and timing of feedback, the quality of feedback and the use of feedback. The setting for this research is a HE competency-based program on Applied Sciences that implemented portfolio assessment. The students completed two questionnaires at the end of the academic year: the Revised SPQ (Study process questionnaire) to measure their approaches to learning and the AEQ (Assessment Experience Questionnaire) to measure their perceptions of the assessment practice. The results show that in comparison with students with a surface approach, students who adopt a deep approach to learning indicate they make more use of the feedback and they perceive the portfolio assessment as motivating and enhancing learning. It is the feedback practices as perceived by the students and the perception of the assessment as motivating and supporting learning, that are related to student learning approaches and not the time and effort students devote to the assessment. Results of the MANOVA analyses indicate no significant differences in learning approaches and perceptions between first, second year students and students following the shortened program neither between students with different prior education. The results confirm that when implementing new modes of assessment such as portfolio assessment, feedback is essential. Moreover, it is not the assessment design but how it is implemented and how students' learning is stimulated through the assessment that influences the quality of learning.

Are assessment environments gendered? An analysis of the learning responses of male and female students to different assessment environments

Graham Gibbs, University of Oxford, *United Kingdom*
Gill Turner, University of Oxford, *United Kingdom*
Harriet Dunbar-Goddet, University of Oxford, *United Kingdom*

The University of Oxford has a distinctive assessment environment with most or all marks deriving from a small number of examinations at the end of three years. At Oxford male students often show a different pattern of performance than do female students, with male students obtaining more high and low marks and fewer medium marks. This pattern has been evident for many years despite efforts to eliminate the effect through changed marking practices. A version of the Course Experience Questionnaire (the OSCEQ) is administered to all third year undergraduates at Oxford each year and in 2006 additional questions were included to elicit student perceptions of the extent to which aspects of the Oxford environment advantaged male students. The paper will report the relationship between these responses, the gender of the respondent, and the questionnaire items concerning appropriateness of assessment and feedback on the OSCEQ. A parallel study has examined the responses of students in three undergraduate programmes in each of three universities (including Oxford) with highly contrasting assessment environments. Data from administration of the Assessment Experience Questionnaire (AEQ) shows that students respond quite differently to these different assessment environments. This paper will report patterns of response to different assessment environments of male and female students. The paper will raise questions about common assumptions about the benefits to all students of particular features of assessment environments in the light of analysis of gender differences.

I 7
30 August 2007 14:30 - 16:30
Room: Konferencia
Symposium

Design-based research: Promises, potential and pitfalls (Proposal of the International Academy of Education)

Chair: **Erik De Corte,** University of Leuven, *Belgium*
Organiser: **Erik De Corte,** University of Leuven, *Belgium*
Organiser: **Monique Boekaerts,** University of Leiden, *Netherlands*
Discussant: **Denis C. Phillips,** Stanford University, *USA*

Educational research has a dual goal: developing and building theories about learning and development, and about the impact of instructional/pedagogical interventions on both learning and development, on the one hand, and contributing to the innovation and improvement of educational/classroom practices, on the other hand. Looking at the history of the field shows that there has always been a tension between both goals. In the early 1990s especially in the US the conduct of design experiments has been put forward as a methodological approach to overcome the tension between both goals (or to bridge the gap between research/theory, on the one hand, and classroom practices, on the other hand). But at the same time a counter- movement – which is moreover currently policitically supported in the US - has been launched, that criticizes design-based research and puts forward randomized field trials as the gold standard for educational research. The aim of this symposium is to unravel and discuss from different perspectives – developmental psychology, instructional psychology, and philosophy of education - the promises, the potential, but also the possible pitfalls of design-based research in the light of the dual goal of educational research mentioned above, namely building theory and contributing to the improvement of educational practices.

Design-experiments: A tool for bridging the theory-practice gap relating to education
Erik De Corte, University of Leuven, *Belgium*

Research on learning and instruction has developed tremendously, and investigators intend to contribute to the improvement of education. But complaints about the gap between theory/research, on the one hand, and educational practices, on the other hand, have been and are still the order of the day. In the early 1990s Collins (19920 and Brown (1992) have launched in the U.S.A. the idea of design experiments (DEs) as an approach to bridge this gap. In this presentation it will first be argued that the intervention approach to research on learning and instruction – the gist of design experiments – originated much earlier, albeit that different labels have been used. Then two criticisms of design research (see e.g., Phillips & Dolle, 2006) will be discussed. Design experiments aim at the simultaneous pursuit of the advancement of our understanding of the processes of learning and instruction, on the one hand, and at the improvement of classroom practices, on the other hand. Phillips and Dolle (2006) dispute the potential of DEs to achieve both goals simultaneously. Second, and very importantly, theyDEs are from a methodological perspective criticized for lack of control and randomization resulting in confounding of variables. It will be argued that under cettain conditions DEs can accommodate both main objections.

Design-research: Waltzing with an octopus
Monique Boekaerts, University of Leiden, *Netherlands*

In the past decade, my colleagues and I have been developing the theory of Self-Regulation. At the same time we wanted to contribute to school innovation and improve classroom practices. As such, we set up design experiments that targeted both theory development and classroom innovations. During these years, we constantly felt the tension between wanting to contribute to theory development and advising teachers on how they could help students to improve their self-regulation. In line with design experiments in the US, we defended the view that both these goals could be achieved concurrently, provided the intervention research is carefully designed. Recently, this view has been challenged (see Phillips and Dolle, 2006) and it is necessary to regroup and join forces. In my presentation, I will address the question as to whether or not we can achieve both goals simultaneously, illustrating how we tried to straddle the divide between achieving gains in classroom improvement and maintaining high research standards. I will outline what the necessary and sufficient conditions are for planning design experiments.

The educational relevance of cognitive acceleration research
Andreas Demetriou, University of Cyprus, *Cyprus*

Cognitive acceleration research is connected to cognitive developmental theories. Its aim is to boost and accelerate the ascension of children along a developmental ladder by assisting children to solidify the concepts and cognitive operations and skills presumably related to their particular phase of cognitive development and lead them to successfully move onto a more advanced level of cognitive development. Ultimately, this research aims to help children to make full use of their developmental potential for the sake of learning in domains of science and knowledge that are of relevance to school and real life. These experiments started with the research of the Genevans on learning in the early 70s and they continued with the research of many post-Piagetians, including Shayer and Adey in the UK, Case in the USA and Canada, and our research in Greece and Cyprus. This research showed, in contrast to its influence on education, that cognitive acceleration is possible, its effects generalize to educationally relevant school subjects, such as mathematics, science, and language, and they last. Unfortunately, however, interest in this research faded away with the decrease of interest in cognitive developmental research as such. The presentation will attempt to highlight what has been learned from this research in terms of principles and practices for supporting learning and thinking, specify possible epistemological and practical reasons for its rather limited impact on education, and suggest ways that can make this research able to fertilize current educational research, practice, and policy making.

Designing prevention programs in kindergarten: The example of the Würzburg phonological awareness training program
Wolfgang Schneider, University of Würzburg, *Germany*

For more than three decades, educational researchers have explored ways to minimize children's risk to develop reading and spelling problems in school. Based on findings from basic experimental research, the impact of early phonological information processing abilities was found to be essential. Consequently, kindergarten training programs were implemented in different parts of the world (Europe, Australia, the US) that helped in improving young children's phonological skills (e.g., their ability to make sense of the sound structure of the spoken language). In most cases, such intervention approaches were very successful, predicting children's subsequent reading and spelling performance in elementary school. In this paper, developmental stages in the

construction of the Wýrzburg Phonological Awareness Training Program are described. Over a period of about 15 years, this program was successively tested, evaluated, and improved until a training version emerged that proved successful for the vast majority of children included in the program. The developmental process reflects a systematic interplay between theory building and testing on the one hand (using controlled experimental approaches) and the implementation of training units derived from the theory building process. In our view, the steps taken to develop this training program nicely demonstrate the advantages of a design-based research approach for improving traditional educational practices.

I 8
30 August 2007 14:30 - 16:30
Room: 4.95
Symposium

Frameworks for the analysis and evaluation of self-regulation interventions with children

Chair: **David Whitebread,** University of Cambridge, *United Kingdom*
Organiser: **David Whitebread,** University of Cambridge, *United Kingdom*
Discussant: **Rikki Rimor,** Teachers College of Technology, Tel Aviv, *Israel*

With the growing international recognition of the significance of developing learners' capabilities for self-regulation, innovations designed to encourage self-regulation in children in relation to a range of educational contexts and purposes are increasingly prevalent. This symposium brings together four approaches to developing frameworks designed to help analyse and evaluate the effectiveness of self-regulation interventions with children in the age range 7-12 years. The first paper from Germany reports the development of an observation scale to register elementary school teachers' strategy instruction and their arrangements of learning environments conducive to self-regulated learning. The development of this assessment instrument is based on the CLIA-model, a framework for designing powerful learning environments developed by De Corte et al (2004). The second paper reports research from Chile involving an innovative program designed to help parents work more effectively with children experiencing learning difficulties. A multi-dimensional framework for the analysis of parent-child interactions has been developed, again based on observational data. This has enabled highly productive analysis at the level of social and cognitive synchrony. The third paper reports the development of a framework for the analysis of self-regulation during a cognitive intervention program for children with motor learning difficulties. A structured coding system and a process-orientated dynamic assessment approach were developed to analyse the self-regulatory behaviours of the children, together with the interactive processes between the child, a peer in the collaborative tasks, and the researcher. The final paper reports research from Israel which documents the value of using mutli-level analysis of metacognition in a study of explicit instruction of meta-strategic knowledge in authentic science classrooms. The three levels of analysis developed involved quantitative and pattern analysis of data from written tests and tasks, and case study analysis also involving in-depth interviews.

Assessing the instruction of self-regulated learning in real classroom settings
Charlotte Dignath, University Johann Wolfgang Goethe, Frankfurt, *Germany*
Gerhard Büttner, University Johann Wolfgang Goethe, Frankfurt, *Germany*
Hans-Peter Langfeldt, University Johann Wolfgang Goethe, Frankfurt, *Germany*

This study should provide an insight into direct and indirect ways of strategy instruction in real classroom settings. For this purpose, an assessment instrument was developed to register teachers' strategy instruction and their creation of learning environments which are conducive to self-regulated learning. In addition to be taught direct and systematic strategy instruction, students need opportunities for exercising self-regulated learning. Therefore, features of the learning environment that foster the application of self-regulation strategies should also be assessed. In order to meet these demands, we designed an observation scale to code teachers' instruction and classroom arrangement in real classroom situations. Prior to the collection of live observational data, two observers went through a training program consisting of about twenty hours. Inter-observer reliability checks based on the coding of video-taped lessons for three separate instructional variables (classroom context, type of instruction, and type of strategy) ranged above 0.6 (Cohen's Kappa). A first live collection of observational data in elementary classrooms revealed a high amount of indirect strategy support by means of cooperative learning forms; however, most teachers did not train self-regulation strategies in a systematic or structured way. These results implicate a need for training teachers how to implement strategy instruction in their teaching, as well as how to use cooperative learning in an effective way to create learning environments that foster self-regulated learning amongst students.

From individual to group units of analysis: Exploring the impact of family synchronic events on children's self-regulated learning
Deborah Pino Pasternak, University of Cambridge, *United Kingdom*

The aim of this paper is to present a multidimensional framework for the analysis of parent-child interactions able to account for social and cognitive dimensions that significantly impact on children's opportunities to engage in self-regulated learning (SRL). This paper will argue that in order to reach a more complete and process-oriented understanding of parent-child dynamics and their relative impact on children's SRL dyadic or group units of analysis are required. Eight Chilean families (mother-child dyads and father-mother-child groups) participated in a six-session intervention programme oriented to foster a self-regulated approach to academic tasks in the areas of reading and mathematical problem solving. Children (7 to 10 year-olds) were all achieving below average in maths and language and they all showed poor profiles of SRL at the start of the programme. All sessions of the programme were video-taped for later analysis. A two stage process of analysis was carried out involving the analysis of individual parent and child behaviours as well as the analysis of dyadic/group units of analysis (social and cognitive synchronic events). Results indicate the positive impact of highly demanding cognitive synchrony and warm social synchrony on children's SRL. Results also highlight the impact of children's motivational patterns on family dynamics at the social and cognitive level.

The role of self-regulation in motor learning: Analyzing self-regulation during a cognitive intervention program for children with motor learning difficulties
Claire Sangster, University of Cambridge, *United Kingdom*

Traditionally, research and intervention efforts with children with motor learning difficulties have focused on understanding and addressing the underlying neurological deficits believed to

contribute to these movement difficulties. More recently, in clinical practice a cognitive learning paradigm has been applied to studying the nature of the problems experienced by children with movement difficulties, which assumes that these children have fewer cognitive and metacognitive skills with which to learn motor tasks and solve motor performance problems. In other words, they are said to be poorly self-regulated during motor learning. Despite this development, the self-regulation of motor skill acquisition has received little attention in the research literature. The present research aims to more fully explore self-regulation in the context of motor performance and the role of a cognitively based intervention approach in facilitating the development of self-regulatory skill for motor skill acquisition. Twenty children, aged between 7 and 9 years, participated in the project. The sample was divided into two groups, those presenting with motor difficulties and those demonstrating age-appropriate motor skill development. Each child participated in 10 sessions that incorporated a previously developed cognitively oriented intervention program for motor learning. The proposed conference presentation will focus on the role of this intervention protocol in facilitating more effective self-regulatory behaviour in children by presenting data which demonstrate that 1) before intervention, the quality of self-regulation in children with movement difficulties is different than that of typically-developing children and 2) the intervention program influenced self-regulatory skill during motor performance for children with movement difficulties. The presentation will pay particular attention to the framework used for observing and analysing self-regulatory behaviour within the context of a cognitive intervention program.

Analyzing the teaching of meta-strategic knowledge: the value of using an integrated research methodology

Adi Ben David, Hebrew University, Jerusalem, *Israel*
Anat Zohar, Hebrew University, Jerusalem, *Israel*

The goal of this presentation is to document the value of using an integrated research methodology in the study of a meta-strategic intervention. The presentation focuses on three levels of analysis for the same set of data: (a) A microgenetic level resulting in quantitative data and in a statistical analysis; (b) A level of portraying individual thinking patterns across time that allows the identification of six recurring learning patterns; (c) A level of case analysis. Each level of analysis addresses different research questions, thereby documenting the benefit of using multiple levels of analysis in metacognitive research.

I 9
30 August 2007 14:30 - 16:30
Room: 0.79 Jánossy
Symposium

Constructing meaning from multiple information sources

Chair: **Ivar Bråten,** University of Oslo, *Norway*
Organiser: **Eduardo Vidal-Abarca,** University of Valencia, *Spain*
Organiser: **Ivar Bråten,** University of Oslo, *Norway*
Discussant: **Anne Britt,** Northern Illinois University, *USA*

This symposium examines learners' integration and comprehension of multiple documents with different methodologies and from different perspectives. The papers address current survey research and experimental research with students at different educational levels in relation to activities ranging from the reading of traditional print-based texts to Internet-based learning. Bråten, Strõmsõ, and Samuelstuen focus on the effects of task instruction and personal epistemology on the comprehension of multiple, partly conflicting printed texts about climate change. In that study, undergraduates have been used to test whether topic-specific epistemological beliefs can moderate the relation between task instruction and multiple text comprehension. Vidal-Abarca, Gil, and Cerdán report on two experiments where they collected online data to examine the integration processes of undergraduates reading multiple texts on a computer application. In the first experiment, they focus on the integration processes of readers given different task instructions; in the second, they examine the effects of note taking on readers' integration processes. The perspective represented in the paper by Le Bigot, Rouet, and Coutieras considers how undergraduate and graduate students' judgements of the authority and credibility of sources may impact their comprehension of multiple documents presented in a hypertext system. In that research, two experiments were conducted where students read documents on climate change varying with respect to source authority. The final paper by Stadtler and Bromme is based on data from students with low topic knowledge searching the Internet with or without a computer tool allowing them to classify their notes from multiple documents. The effects of this tool on the structuring of notes as well as on knowledge acquisition and comprehension are examined. This symposium may contribute to the understanding of processes necessary for developing functional literacy in a knowledge society and how those processes may be promoted.

Topic-specific epistemological beliefs moderate the effect of task instruction on multiple text understanding
Ivar Bråten, University of Oslo, *Norway*
Helge Strømsø, University of Oslo, *Norway*
Marit S. Samuelstuen, Norwegian University of Science and Technology, *Norway*

We examined whether topic-specific epistemological beliefs could moderate the relation between task instruction and multiple text understanding in a sample of 184 undergraduates. Participants read seven texts representing conflicting views on climate change in three different task conditions: (1) participants in the elaborative summary condition read to produce an elaborative summary of the most relevant information, (2) participants in the argumentation condition read to express and justify their personal opinion, and (3) participants in the global understanding condition read to impart a global understanding of the main issues. Participants were divided into nañve and sophisticated with respect to certainty and simplicity dimensions of topic-specific

epistemological beliefs, based on a questionnaire concerning beliefs about knowledge about climate and how one comes to know about climate. We performed two 2 x 3 between-subjects analyses of covariance with adjustment made for gender, age, word decoding, and prior knowledge. Independent variables in each analysis were epistemological beliefs (naïve and sophisticated) and task (elaborative summary, argumentation, and global understanding). In the first analysis, the epistemology groups were formed according to a median split on certainty beliefs; in the second, they were formed according to a median split on simplicity beliefs. The dependent variable in each analysis was intertextual understanding. Both analyses showed significant interactions between task and epistemological beliefs. Compared to readers with naïve epistemological beliefs, those holding sophisticated beliefs seemed to profit from the argumentation task, whereas their intertextual understanding seemed to be hindered when instructed to impart a global understanding of the topic. Under the last condition, readers with sophisticated beliefs even seemed to be outperformed by readers holding naïve beliefs.

On-line evidence of integration of information from multiple documents
Eduardo Vidal-Abarca, University of Valencia, *Spain*
Laura Gil, University of Valencia, *Spain*
Raquel Cerdan, University of Valencia, *Spain*

High-school and college readers often read multiple documents in order to write essays, for which they have to select and integrate information across documents. Our aim in this paper is to provide on-line evidence of the integration processes from two different experiments in which either the task (experiment 1) or the context (experiment 2) were manipulated to enhance the integration processes in the experimental group over the control group. The general idea is to prove that experimental conditions improve the integration of information measured by off-line measures, and then to show how on-line measures may explain that improvement. Reading times and think-aloud methods were used in the first experiment, whereas just the former one was employed in the second experiment. Results from both on-line methods give support to off-line results.

The effects of ontological classification on learning from multiple documents on the Inter-net
Marc Stadtler, University of Munster, *Germany*
Rainer Bromme, University of Münster, *Germany*

The widespread use of learning from multiple texts both in higher education and in scenarios of informal learning (e.g., Internet research) has led text comprehension research to acknowledge the need for a better understanding of how learners synthesize information across multiple documents. We examined the computer-tool met.a.ware, which enables readers to classify their notes taken from multiple documents on the Internet according to a set of ontological categories. We also investigated whether ontological categories provide representational guidance and thereby impact on the contents readers deal with during Internet research (cf., Suthers & Hundhausen, 2003). We finally examined whether ontological classification leads to improved knowledge acquisition as could again be concluded from the theory of representational guidance. 40 university students with low medical knowledge were asked to conduct an Internet search on a medical topic. Participants either took notes with met.a.ware (N = 20) or with a blank text window (N = 20). Searching time was limited to 40 min. Participants used met.a.ware efficiently to structure their notes, as the majority of notes were classified in accordance with the predefined set of ontological categories. In contrast, participants working without ontological classification did not actively structure their notes. Furthermore, the salience of ontological categories stimulated laypersons to seek new elements of the categories at hand, revealing an effect of representational guidance. However,

groups did not differ with respect to the acquisition of factual knowledge, or comprehension of the subject matter. The results provide insights into the effects of representational guidance in a multiple documents situation and have educational implications with respect to the support of readers dealing with multiple documents on the Internet.

The impact of source characteristics on subjective and objective estimates of multiple text comprehension
Jean-Francois Rouet, University of Poitiers & CNRS, *France*
Ludovic Le Bigot, University of Poitiers & CNRS, *France*
Anthony Coutieras, University of Poitiers & CNRS, *France*

Searching the Web for documents of interest requires the reader to generate inferences as regards the quality and credibility of potential information sources. Two experiments investigated the effects of source attribution on students' perceptions of comprehensibility and on their actual comprehension of a set of Web-based documents. In experiment 1, we found that domain novices correctly assessed the competence of artificially manipulated sources. However, the participants also found more authoritative sources (e.g., a scientist expert in the topic) more difficult to understand than less authoritative ones. Experiment 2 aimed at replicating the results using a different set of materials, a larger sample and both subjective and objective estimates of comprehension. The data were being collected at the time of submission.

I 10
30 August 2007 14:30 - 16:30
Room: 0.100A
Symposium

The dynamics of scaffolding: New approaches to scaffolding in the context of cognitive learning

Chair: **Peter Tymms,** CEM Centre Durham University, *United Kingdom*
Organiser: **Henderien Steenbeek,** University of Groningen, *Netherlands*
Discussant: **Paul van Geert,** University of Groningen, *Netherlands*

Currently, most researchers agree that scaffolding is a transactional process, in which both the scaffolder and the scaffoldee make their own unique contribution. This symposium aims at presenting new approaches to studying scaffolding processes that are in accordance with this transactional viewpoint. The focus lies on basic mathematics in young children, but also on the cognitive understanding of problems by older children and adults. The innovative character of the symposium lies in its attempt to making explicit the dynamic factors and mechanisms that make the transactional scaffolding process effective. Effectiveness is defined in creating learning and learning potentials by the scaffold(er), and by the scaffoldee both on the short-term (one scaffolding session) and the long term (the effects on learning). The notion of "dynamics" is filled in by different speakers in accordance with whatever they think is characteristic of the microgenetic process in various types of scaffolding, such as self-scaffolding, scaffolding in small groups, teacher-scaffolding of student learning; scaffold by means of schematic representations. Hardy & Stern discuss the role of visual representations in constructivist learning environments. Granott focuses on attributes of successfull vs. inefficient and other- vs. self-scaffolding in terms

of variability. Van der Aalsvoort presents a study on the effect of the level of the student on the co-construction of knowledge by the student and the teacher. Tunteler & Resing focus on changes over time in analogical reasoning induced by self-scaffolding compared to a reciprocal-scaffolding procedure. Steenbeek & van Geert discuss a dynamic systems approach to process characteristics of scaffolding. A good insight into the effective dynamic factors and mechanisms of scaffolding in the broader sense of the word can help educators to decide what to do on the time scale of real action in order to support a long-term process of learning.

Successful scaffolding and self-scaffolding: Implications for learning and instruction
Nira Granott, Eliot-Pearson Dept. of Child Development OORIM, *USA*

Process-oriented approaches are used for analyzing and comparing the attributes of successfulvs. inefficient scaffolding, and other- vs. self-scaffolding, and drawing their implications for learning and instruction. Several theories are integrated into one framework that identifies different types of scaffolding. Results of two studies are presented, one involving parents scaffolding children, and the other—other- and self-scaffolding by adults. Microgenetic and dynamic systems methods are used for analyzing scaffolding in interrelated processes of participants, and qualitative analysis of critical segments augment the analysis. The findings show that during successful scaffolding, the participants coordinate variability in their activity to variability in their partners' activity. When the process lacks variability, it stagnates and does not develop to higher levels. Successful scaffolding by self or other involves both vertical and horizontal variability, dynamically interrelated across participants. Horizontal and vertical variability strengthens the learning process by reiterating knowledge construction across levels and relating different aspects of the learned content to each other. Self-scaffolding is suggested as a step linking scaffolding to internal construction of the scaffolded knowledge, constituting a critical step for successful learning. The findings about vertical and horizontal variability have implications that may reconceptualize the evaluation of learning processes and contribute to generating successful learning.

The meaning of scaffolding when students choose strategy when doing math
Geerdina van der Aalsvoort, Leiden University, *Netherlands*

The paper describes the meaning of scaffolding when students choose strategies during additions and subtractions. The multi method study applied aimed at revealing teaching and learning processes during additions and subtractions. We tested if shared understanding of arithmetic tasks by teacher and students led to more effective scaffolding during the sums. The sample in the study included 40 students from Grade 3 and their teachers from 20 schools. The 20 highest and the 20 lowest rated students had been selected based upon the results on a questionnaire about classroom behavior by their teachers. Based upon sociocultural theory we investigated how children co-construct knowledge about resolving sums during tasks. Moreover, we studied whether students rated as poor performers differed in using scripts as compared to their high rated peers. Student scripts were operationalized as the answers given by the students following an open-ended question by the teacher. The dyads of one teacher and one student each were offered four two-digit sums and four three-digit sums. The teacher was invited to assist the student in resolving the sums during a 10 minutes session. The tasks were videotaped, and the tapes were used for further investigation. The three-step method to investigate the task included: Instruction of sums; discourse analysis of sessions, and student scripts. The findings revealed that teachers differed remarkably with respect to use of materials during help; the type of questions, and feedback. Moreover, low-rated students' responding to open-ended teachers' questions more often included

structuring than strategy compared to high-rated students. Implications for these findings with respect to effective scaffolding are discussed with regard to teacher training.

Scaffolding learning by the use of visual representations: Domain-specific and domain-general effects on scientific reasoning
Ilonca Hardy, Max Planck Institute for Human Development, *Germany*
Elsbeth Stern, Institute for Behavioral Sciences, *Switzerland*

The construct of scaffolding has been helpful in conceptualizing ways in which learning environments may be structured to allow students' active cognitive engagement in constructivist learning environments. The two key elements of instructional support concern 1) the structuring of tasks to allow students to remain focused on important aspects and 2) the support of students' reflection on their insights within a larger context of scientific reasoning. We suggest that, visual representations such as graphs and diagrams as well as manipulable representations can serve these two functions especially well: They help learners to direct their attention to relevant aspects of a task by providing certain affordances related to the scientific representation of quantities and relationships, and they provide ways in which scientific sense-making in terms of solution procedures and strategic thinking can be experienced. We will report the results of a sequence of studies within the domains of science and mathematics learning in which students were able to develop conceptual insights with the help of visual representations. We were interested not only in contrasting the specific effects of different visual representations such as a density matrix and a balance beam on conceptual understanding in elementary school, we also investigated long-term effects of representational activities on scientific reasoning such as students' ability to interpret graphs. Our results demonstrate that students not only show considerable domain-specific conceptual advances through the use of visual representations, they also develop domain-general reasoning abilities such as proportional understanding and "visual literacy."

Scaffolding and analogical reasoning in young children: A microgenetic study
Erika Tunteler, Leiden University, *Netherlands*
Wilma Resing, Leiden University, *Netherlands*

This presentation focuses on scaffolding analogical reasoning in children in a microgenetic context. The study to be presented investigated changes over time in young children's analogical reasoning induced by self-scaffolding, referring to the interaction between the child and the problem environment without any explicit help from others. This was compared with changes imposed by a reciprocal-scaffolding procedure. The notion of this procedure was to prompt children with hints according to their own needs to explain the way they thought that the experimenter had found the correct solution to an analogical item. A 5-sessions microgenetic procedure was used, 36 6-year-old children divided over 2 conditions participated. A follow-up session was administered after several months. Geometric analogy tasks were used, and analogical reasoning was measured by a combination of both children's overt solutions to the problems and their verbal explanations for their solutions. The data were analyzed at both the group level and the individual level. The findings will be presented during the conference. In general, considerable inter- and intra-individual variability in the use of analogical strategies was found in both conditions. Self-scaffolding caused a gradual improvement in analogical reasoning in some, but not all children. Yet, reciprocal-scaffolding caused an improvement above and beyond that of self-scaffolding, inducing in some children a gradual change, while in others it caused a more rapid change in analogical performance.

A dynamic systems approach to teacher-pupil scaffolding processes during early mathematics in a special education setting
Henderien Steenbeek, University of Groningen, *Netherlands*
Paul van Geert, University of Groningen, *Netherlands*

Traditionally, research about scaffolding focused on the side of the scaffolder. In current research, growing attention is paid to the mutual influence of both participants on the course of scaffolding processes (Mascolo, 2005; Granott, 2005). In accordance with this viewpoint, we study real-time scaffolding processes by means of a microgenetic method, aimed at getting a grip on the co-regulated actions between teacher and individual pupils, and on how they determine the course of the real-time process. The overarching aim is to discover process characteristics of 'normal' and problematic learning and scaffolding trajectories of individual pupils and their teachers. We conduct an empirical study in a naturalistic (school) setting and we build a dynamic systems model of scaffolding and learning processes (van Geert, 1994; Thelen & Smith, 1994). In the empirical study, five pupils in a school for children with behavioral and clinical problems are videotaped while receiving individual instructions by the teacher during math lessons, with two-weekly intervals over a period of two years. Transcripts of verbal actions are made, in which episodes and utterances are coded using a 'developmental ruler' (Fischer, 1980), which comprises the teacher's level of help content, and the pupil's level of understanding. The dynamic model of scaffolding consists of three basic parameters: the pupil's learning rate, the optimal scaffolding distance, and the demand-adaptation rate. In this presentation, we will go into the first empirical results, and relate these findings to the predictions of the dynamic system model. In addition, we will discuss future extensions of the model, aimed at incorporating the socially situated dynamics of learning and teaching.

I 11
30 August 2007 14:30 - 16:30
Room: 0.99
Symposium

Closed to novel practices? Challenges of the uptake of innovations in schools

Chair: **Annalisa Sannino,** University of Salerno, *Italy*
Chair: **Honorine Nocon,** University of Colorado and Health Sciences Center, *USA*
Organiser: **Annalisa Sannino,** University of Salerno, *Italy*
Organiser: **Honorine Nocon,** University of Colorado and Health Sciences Center, *USA*
Discussant: **Anne Edwards,** University of Oxford, *United Kingdom*

Aims The symposium includes presentations of five cases studies of interventionist research aimed at changing schools. The cases come from Finland, Italy, Sweden, the United States, and Japan. The uptake of innovations is a complex, fragile and plastic process which is characterized by contradictory engagement and disengagement on the part of the subjects involved. The contradictory nature of this process of innovation is displayed through material and discursive actions. Drawing on cultural-historical activity theory, the papers discuss the kind of innovation which was implemented in the schools and what happened in each concrete case when the innovative practices and the existing teaching traditions in the school came together through the

interventions. The five papers highlight the actions which have been empirically observed in each interventionist project and from which transpire the contradictory nature of the process of innovation. Particular emphasis in given to the relation between the material actions performed by the participants in each case and the formation of dialogue and collaboration between the different parties. Scientific and educational relevance History has shown that major attempts to introduce new ways of teaching and learning in schools have very often been rejected by the school personnel, become isolated, and died. Eminent examples are found both in alternative schools and in activities aimed at changing schools from within. Mutual connections and interactions between the innovative practices and the consolidated teaching tradition in school can take the shape of benign neglect, failure to engage, reluctance, withdrawal, criticism, or open conflicts. This symposium analyzes what might be done, creatively, to support the uptake of innovations, acknowledging the many real barriers, beyond perceived resistance. In other words, in addition to a critical analysis of the problem, the symposium also suggests creative approaches to change.

What is educational innovation? A case study of long-term university-school collaboration
Monica Nilsson, School of Management, *Sweden*

This paper asks and discusses the general question: what is educational innovation? We examine a ten-year case study investigating a long-term relationship between an elementary school and a university in Sweden. The relationship is jointly constructed and mediated by local, national and international projects. We consider these jointly constructed and shared projects as innovations for both the school's and the university's pedagogical practices. Significant actors in the different projects have been teachers, undergraduate and graduate students, pupils, and researchers. The collaboration – which still exists— started in 1996 and has gone through stages that vary in intensity and scope. This relationship may be metaphorically described as a thin string— occasionally almost invisible, yet strong enough to sustain long-lasting collaboration aimed at educational innovation. A historical analysis of the trajectory of the collaborative process will be presented. The analysis is aimed at explaining why this collaboration exists and what makes it sustain itself. The data consist of interviews, e-mail messages, meeting minutes, field notes, project plans, project reports, syllabi, and student reports. The study contributes to our understanding of sustainable educational innovation and to the development of research methodologies for the study of long-term collaborative intervention efforts.

School time and researcher time: Temporal contradiction in collaborative school research
Honorine Nocon, University of Colorado and Health Sciences Center, *USA*

The sustainability of research-based innovations in schools is constrained not only by systemic institutional barriers and inherent contradictions between the activities of schooling and research, but also by related issues of time and presence. As hypothesized by Lemke (2000) the case study analyzed in this paper suggests that relative timescales, e.g., the collective activity of schooling over decades versus the individual actions of researchers over a semester, appear to determine the probability of interdependence that enables the coordination of schooling and research processes. Using a conceptual framework based on cultural-historical activity theory (Engestrom, 1999) and heterochrony - the concept of long timescale processes that produce effects in much shorter timescale actions (Lemke 2000), this paper presents an analysis of data collected over a four-year period in which a university research team was actively engaged with school personnel in collaborative development of an innovative literacy and technology club. Several related research projects emerged from the club. In spite of active coordination, cooperation, and communication among school-based and university-based individuals and the institutional partners, temporal

contradictions on different timescales served to undermine collaborative research activity even as it emerged. However, though the innovative club was not sustained, elements from the innovation as well as from related research projects did enter into school practice in diluted form. This process appears to have been facilitated by involvement of research team members in actions organized by the activity of schooling. This case study contributes to an emerging body of research on the role of time in human activity, and particularly educational research. It also contributes to the literature on the sustainability of educational innovations and has implications for the practice of educational research in terms of methods and design as well as for the construction university-school research collaborations.

Teachers' encounters with pupils' agency: Potentials and tensions in a narrative playworld interaction
Anna Pauliina Rainio, University of Helsinki, *Finland*

Although teacher commitment is seen as crucial in the promotion of educational change (i.e., Gitlin & Margonis, 1995), less attention has been paid to pupils' role and involvement in school interventions. The aim of this paper is to examine the development of children's agency in a teacher-led intervention in an elementary school. The paper focuses on adults' actions, which both enable and hinder children's initiatives in the activity. The analysis is based on video data collected in an ethnographic case study of The Brothers Lionheart Playworld Project. In the project pupils and teachers took on the role of characters from a piece of literature and acted inside the frames of an improvised plot (Lindqvist, 1995). The activity in question was both improvisational and open-ended in nature. The findings suggest that in order to create spaces for children's agency in classrooms the adults must be willing to change their own roles in the process and step into a dialogical relationship with children. The findings also show that there is potential in narrative learning approaches for altering the traditional positions between teachers and pupils. This is, however, a challenging task in the school institution in which the power relations between teachers and pupils are relatively predetermined (i.e. Pollard, Thiessen & Filer, 1997). Both adults and pupils face tensions in managing the "double-task" of narrative activity, simultaneously acting as characters in the story and maintaining their teacher-pupil roles. These tensions however also create the main developmental potential of the intervention. The paper develops conceptualizations of the micro-processes of interaction between children and adults as they are moving in, or better, creating together, the zone of proximal development for their involvement in implementing the playworld.

Cultivating agency for sustaining innovation in contradictory practices: Only a utopia?
Annalisa Sannino, University of Salerno, *Italy*

This paper is an empirical contribution to the conceptualization of agency as a socially distributed phenomenon that interacts with the contradictory nature of developing innovative practices. The paper explores the reasons why an initially successful innovative practice was not sustained. The innovative practice is a computer-mediated activity system internationally known as 'Fifth Dimension' (5D). 5D was promoted as a research intervention within a project of collaboration between a university and a local elementary school for developing the work of teachers. The paper aims at answering the following research questions: How is individual and collective agency manifested in the course of this research intervention? How might researchers facilitate and empower sustainable developmental efforts among the individuals and collectives involved in an intervention? The analysis focuses on the participation of four key groups of actors in the project: the teachers, the internship students, the internship supervisor, and the researchers. The analysis

proceeds first by identifying sequences of actions by the participants and then by revealing contradictions in these sequences. The sequences of actions are constructed starting from the statements in interviews conducted one year after the intervention. The statements are conceptualized as warrants, i.e., justifications that the participants give for not continuing 5D. The action sequences are then built tracing backward actions thematically connected to these warrants. Such actions are typically breakthroughs or ruptures initiated or experienced by the participants. The analysis leads to the identification of contradictions in the activity of each group of participants which potentially explain why the participants did not engage in an agentive effort to pursue further the innovative practice. The sequences of discontinuous actions and the contradictions form a texture which became impenetrable from the point of view of engaging in a self-reflective discussion among all the participants on the future of the ongoing innovative practice.

Expansive learning in multiple learning activities for school innovation
Katsuhiro Yamazumi, Kansai University, *Japan*

This paper focuses on new forms of learning that attempt to transform the pedagogical activity of the traditional school. These new forms of learning are conceptualized with the help of the framework of cultural-historical activity theory and the notion of expansive learning. The paper analyzes the process of implementation of a children's after-school project called New School (NS). NS is an inter-institutional, collaborative project among the following partners: a university, an elementary school, families, expert groups and community organizations outside the school. This paper aims at illustrating the dynamics through which the multiple parties involved in the NS project engage in the process of expansive learning for designing and implementing new activities. In particular, the analysis explores to what extent the different partners in the NS cross boundariesbetween their activity systems, are willing to make school innovations together, and become collaborative change agents. The analysis of the NS intervention leads to the preliminary finding that the collaborative change effort was characterized by three sets of intensive contradictions between the activity systems involved: 1) contradictions between the institutional logics of school activities and the NS activities, 2) contradictions between the activities of in-service teachers, pre-service teachers enrolled as students at the university, and the children, 3) contradictions between the activities of the elementary school and productive practices of everyday life outside the school.

I 12
30 August 2007 14:30 - 16:30
Room: 0.89 Jedlik
Symposium

Examining the potential of classroom discussion to promote high-level comprehension of text

Chair: **Kristiina Kumpulainen,** University of Helsinki, *Finland*
Organiser: **Ian A. G. Wilkinson,** The Ohio State University, *USA*
Discussant: **Michael Townsend,** Massey University, *New Zealand*

The aim of this symposium is to present results from a 4-year project that examined the potential of classroom discussions as a means of promoting students' high-level reading comprehension. First, we identify 9 approaches to conducting discussion that have a record of peer-reviewed empirical research over the last three decades and consistency of application in elementary or high-school settings. We present a conceptual framework for understanding the similarities and differences among these 9 approaches in terms of various parameters of group discussion. Second, we present results of a meta-analysis of 46 quantitative studies that examined the effects of the approaches on measures of teacher-student discourse as well as on individual comprehension and learning outcomes. Third, we present results of an analysis of the discourse arising from the discussions to provide an understanding of the nature of students' thinking in each of the approaches. Fourth, we describe an integrative model of text-based discussion to promote high-level reading comprehension that combines features of the 9 approaches while foregrounding those features that give prominence to fostering a critical-analytic stance toward text. We present results of a quasi-experimental study in 14 grades 4-6 language arts classrooms that examined teachers' implementation of the model and investigated its impact on students' comprehension. Taken together, the results provide converging evidence on the use of classroom discussions as a means of promoting high-level comprehension of text. They provide a basis for developing a general model of productive discussions that teachers can implement in a variety of ways depending on their instructional goals and the contexts in which they work.

Developing a conceptual framework for classroom discussions about text
Ian A. G. Wilkinson, The Ohio State University, *USA*

The aim of this paper is to present a conceptual framework for understanding different approaches to conducting classroom discussions that have potential for promoting high-level comprehension of text. We identified 9 approaches to conducting discussion that have a record of peer-reviewed, empirical research conducted in the last three decades and consistency of application in elementary or high-school settings. Coders read documents and viewed videos describing the approaches and characterized them on various parameters of discussion. Results showed that most variation across approaches was in the degree of control exerted by the teacher versus the students in terms of interpretive authority, turn-taking, topic, and choice of text. The approaches also varied in stance toward text. Discussions in which students have the greatest control tend to be those that give prominence to an expressive stance to the text; discussions in which teachers have the greatest control tend to be those that give prominence to an efferent stance; discussions in which teachers and students share control tend to be those that give prominence to a critical-analytic stance. Coders' ratings suggest that at least a reasonable degree of focus on the efferent and the expressive

stances needs to be in place in order for discussion to foster a high critical-analytic response to text. We speculate that the shared control between teacher and students is the group-level substrate that helps give rise to efferent and expressive responses; further, at least a moderate degree of emphasis on the efferent and expressive stances seems to be necessary for the critical-analytic stance to achieve prominence.

A meta-analysis of the effects of classroom discussions on students' comprehension of text
P. Karen Murphy, The Pennsylvania State University, *USA*
Maeghan N. Edwards, The Pennsylvania State University, *USA*

Discussions about and around text have the potential to increase students' comprehension, metacognition, critical thinking and reasoning, as well as students' ability to state and support arguments. To date, however, no studies have comprehensively reviewed the vast body of literature on classroom discussions to examine the effects of various discussion approaches on students' comprehension and learning. The purpose of this presentation is to overview results of a comprehensive meta-analysis of empirical studies examining evidence of the effects of classroom discussion on measures of teacher and student talk and on individual student comprehension and reasoning outcomes. Results showed that several approaches produced very strong improvements in the amount of student talk and concomitant reductions in teacher talk, as well as substantial increases in comprehension. The effects were moderated by the nature of the outcome measures and study design. Finally, the approaches exhibited greater effects when employed with below-average ability students and weaker effects with above-average students. Implications for research and practice will be offered.

Analysis of the discourse of classroom discussions about text
Anna O. Soter, The Ohio State University, *USA*
Lucila Rudge, The Ohio State University, *USA*

In this study, we sought to identify features of the discourse arising from discussion that might serve as proximal indices of students' learning and comprehension, and to evaluate various approaches to discussion on these indices. Our intent was to identify discourse features for which there was good theoretical warrant for believing they were linked to high-level thinking and comprehension and good empirical research demonstrating that connection. Transcripts that represented 'typical' discussions were solicited from proponents of 9 discussion approaches, namely, Grand Conversations, Literature Circles, Book Club, Instructional Conversations, Questioning the Author, Junior Great Books Shared Inquiry, Paideia Seminar, Collaborative Reasoning, and Philosophy for Children. Discourse features coded were: authentic questions; uptake; questions that elicited high-level thinking; questions that elicited affective, intertextual, and shared knowledge references; elaborated explanations; exploratory talk; and reasoning words. Authentic questions, uptake, and questions that elicited high-level thinking were prevalent in the discourse of most of the approaches, most notably in Collaborative Reasoning, and less so in Instructional Conversations and Questioning the Author. Contrary to our expectations, questions that elicited affective, intertextual, or shared knowledge references were not prevalent; indeed, intertextual references and shared knowledge references were virtually nonexistent. Those approaches that give prominence to a critical-analytic stance toward text (Collaborative Reasoning, Paideia Seminar, Philosophy for Children) tended to show the highest incidences of elaborated explanations and exploratory talk. While some researchers appear to be unsure about which measures are appropriate for assessing student's high-level thinking and comprehension of text, our analyses of discourse suggest that authentic questions, uptake, elaborated explanations,

episodes of exploratory talk, and the relative density of reasoning words may indeed provide useful measures of productive discussions despite the highly situated nature of classroom discussions.

Promoting high-level comprehension through quality talk: A quasi-experimental study
Ian A. G. Wilkinson, The Ohio State University, *USA*
Anna O. Soter, The Ohio State University, *USA*
P. Karen Murphy, The Pennsylvania State University, *USA*

The aim of this paper is to describe an integrative model of text-based discussion to promote high-level reading comprehension, developed from our earlier analysis of discussion approaches, and to report results of an initial investigation into teachers' implementation of the model. We developed a model of discussion for promoting high-level comprehension that we call Quality Talk. This model combined the best features of 9 discussion approaches identified in our earlier work, while foregrounding features that give prominence to a critical-analytic stance toward text. We conducted an investigation into Quality Talk using a quasi-experimental design with a within-program control. Fourteen language arts teachers in 4th-(n=5), 5th-(n=7), and 6th-(n= 2) grade classrooms from three suburban school districts and a Catholic archdiocese participated. All teachers took part in a series of professional development sessions in the model at the beginning of the school year. Following these sessions, seven teachers were assigned to the experimental group (ongoing professional development) and seven to a comparison group. Teachers in the ongoing professional development condition attended three additional professional development sessions and were given in-class coaching throughout the year; teachers in the comparison condition received only the initial professional development. Results revealed considerable variability in implementation of Quality Talk in both conditions. Nevertheless, results suggest that students in the experimental group outperformed students in the comparison group in comprehension at 4th grade though not at 5th and 6th grade. The advantages were most apparent on short-answer, constructed response items. Discussions appear to have been most productive where there was a classroom culture of dialogic inquiry that supported the pedagogical principles inherent in our model.

I 13
30 August 2007 14:30 - 16:30
Room: 0.100B
Symposium

Different lenses: Convergence of observer, teacher and student assessment of classroom practice

Chair: **Marten Clausen,** University of Mannheim, *Germany*
Organiser: **Marten Clausen,** University of Mannheim, *Germany*
Discussant: **Urs Grob,** University of Zurich, *Switzerland*

Coming from different research traditions, scholars in teacher training, educational psychology and curriculum development have developed similar techniques to measure the classroom environment – and have run into similar problem while doing so. The purpose of this symposium is to bring scholars together who share the classroom as the locale of their empirical research and

the intricacies of defining its properties but with distinguishable goals in mind. The research presented by Kempler, Cortina, & Blumenfeld aims at the development and improvement of a new curriculum which is, at lest to a certain degree, independent of the teacher. The presentations by Tamara Murdock and Angela Miller are specifically interested in the motivational atmosphere that teacher create in the classroom which is at least in part irrespective of the curriculum. Similar to Angela Miller's presentation, the work by Katrin Rakoczy, Eckhard Klieme & Christine Pauli triangulates inconsistencies between teacher and students in their assessment of the classroom by introducing systematic observer rating. Interestingly, they used a similar technique as Kempler et al. while asking a very different question. In the Kempler et al. study, the observer ratings are in place to order to assess teachers' congruence and the quality of their curriculum's enactment. The final presentation by Clausen underscores that despite its complexity and the multitude of research questions that lead to its measurement, there is a limited number of concepts and constructs of relevance and avenues to measure them.

Perceptions matter – convergence and divergence of teacher, student and observer reports in measuring classroom goal structure
Angela D. Miller, University of Kentucky, *USA*

Achievement goal theory focuses on the meaning that students make of learning as well as of the learning environment which teachers create through their classroom behaviors. Given the considerable variability within any classroom in how the classroom goal structure is perceived by the students, we assume that the students' perceptions are not only a function of the teacher's behavior, but also a result of the students' own personal histories and personal goals. The purpose of this longitudinal study is to examine the convergence and divergence of student and teacher reports of classroom goal structure over the academic year by contrasting both data sources with structured observational data. Students and teacher perceptions of classroom goal structures were collected using the Patterns of Adaptive Learning Survey at two time points during the academic school year. Twelve math classrooms were selected from a larger study based on the variability in students' perceptions of goal structures at the first measurement point. Three independent observers completed running records of classroom interactions for a minimum of 4 hours of observation time. Observers also completed a rating sheet at the end of each observation block focused on major classroom indicators including student-teacher interaction, level of questioning, student on task behavior, and student autonomy. Examination of observer ratings indicated strong agreement with students perception data rather than teacher report in terms of noted teachers behaviors that indicated performance goal structures (focus on evaluation and grades) and mastery goal structures (focus on effort and learning). The findings suggest that idiosyncratic elements in students' assessments of the classroom environment tend to even out when aggregated information is used.

Motivational support in the classroom – different perspectives on instruction and their impact on students' learning motivation in mathematics
Katrin Rakoczy, DIPF Frankfurt, *Germany*
Eckhard Klieme, DIPF Frankfurt, *Germany*
Christine Pauli, University of Zurich, *Switzerland*

According to Self-Determination Theory three basic psychological needs determine motivational processes: need for competence, need for autonomy, and need for social relatedness. Several instructional features are known to cater to these needs from the students' perspective: a) the learning environment that provides the students with real alternatives and choices, b) transparent

classroom goals and clear procedural rules that reflect a common understanding of norms, c) supporting feedback, and d) emphasis of the relevance of content. Most studies these findings are based on investigate instruction exclusively from the students' perspective, revealing strong relationships between the students' perception of instruction and their motivation. But how do aspect of the instructional settings perceived by the students map on to teaching practices that can be independently observed? Using 20 Swiss and 20 German selective secondary classrooms, we used expert ratings of videotapes and contrasted them with scales from a student questionnaire tapping, among others, at the perceived motivational support in the classroom. Our findings demonstrate that, in fact, students' perception of motivational support in mathematics classrooms corresponds with observational measures. In order to consider individual and class level variables simultaneously, we applied multilevel analyses to further analyze the data. These analyses show that students are particularly more intrinsically motivated if the classroom is well structured. Moreover, this observed aspect of the instructional setting is related to the individual and shared perception of motivational support which, in turn, leads to increased individual motivation.

Convergence in students and observers' reports of instruction within the context of evaluating a reform-based science curriculum
Toni M. Kempler, Rutgers, The State University of New Jersey, *USA*
Kai S. Cortina, University of Michigan, *USA*
Phyllis C. Blumenfeld, University of Michigan, *USA*

Studies of classroom practices have relied on several methodologies developed in different research traditions. Surveys assessing students' classroom perceptions have often been used because students can report on classroom experiences over an extended period of time; Observation rating systems have been developed to identify specific instructional practices that positively influence learning, with the goal of improving teacher training and curriculum materials. However, it is unclear to what extent reports of students and objective observers concur in their assessment given that questionnaire scales tend to be more generic while trained observers focus on specific aspects of teaching practice. The purpose of the current study is to better understand convergence of students' and trained observers' reports of classroom instruction during the implementation of a reform curriculum. 24 teachers were observed a total of six times across the curriculum unit as they enacted different types of lessons (e.g. inquiry, benchmark). 1360 students completed questionnaires administered at the end of the curriculum unit. Two measures designed to examine the same classroom instructional practices were used to determine whether students' perceptions matched with specifically for the purpose of the evaluation developed observation measures. The observational rating system examines the quality of teacher instruction, defined within the context of enacting a reform-based science curriculum. The student survey asked their perceptions of three instructional practices parallel to those dimensions assessed by the observation instrument. Results indicate that students and observers provide different perspectives when characterizing classroom instruction. These findings should not be interpreted to suggest that one measure should be replaced, but rather that each is valid and informative. Students may be less able to report on the structure and quality of instructional practice, but instead provide a more summative picture of their classroom experience.

Instructional quality – Integrating diverging measurements of classroom environment
Marten Clausen, University of Mannheim, *Germany*

In this paper, I summarize and integrate theoretical approaches in the assessment of quality of instruction and illustrate the use of an integrated perspective for intercultural comparisons of

instructional practice. A plethora of different constructs has been developed to operationalize various aspects of instruction. Unfortunately, this has caused terminological confusion since the same term is sometimes used for different entities or different terms for similar constructs causing a. lack of concurrent and discriminant construct validity. We suggest four larger principal "meta factors" which cover the vast majority of concepts discussed in the literature (1) Classroom Management constructs (e.g., classroom management, time on task, rule clarity), (2) Clarity/Structure construct (e.g., clarity & structure, previews & cues), (3) Student Orientation constructs (e.g., student-orientation, individualization, individual learning support), and (4) Cognitive Activation constructs. Constructs used in instructional research are usually indirectly assessed by teachers' self-assessment, student ratings, or by ratings of trained observers. Looking for differential expertise, these three perspectives are often analyzed and compared regarding their convergence and their specific advantages and disadvantages in assessing the quality of instruction. In order to illustrate the integrative approach and its usefulness in furthering our understanding of instructional practice, we will presented data analysis based on high inference video ratings from trained scientific observers and questionnaire data from teachers and students, which were collected and generated in the context of the German part of the TIMSS-Video Study (85 lessons) and a Swiss comparison study (156 lessons from different parts of Switzerland), which extended the TIMSS-Repeat-Video study. While differing in their relative importance, the four meta-factors are fairly stable across both countries. However, Germany and Switzerland, show pronounced differences in classroom management and student orientation in Switzerland, but similar levels of structure/clarity and cognitive activation.

I 14
30 August 2007 14:30 - 16:30
Room: -1.63
Symposium

Representational drawing in childhood: Development, context and instruction

Chair: **Eva Teubal,** David Yellin Teachers' College, *Israel*
Chair: **Nora Scheuer,** CONICET-Universidad Nacional del Comahue, *Argentina*
Organiser: **Eva Teubal,** David Yellin Teachers' College, *Israel*
Organiser: **Nora Scheuer,** CONICET-Universidad Nacional del Comahue, *Argentina*
Discussant: **Julie Dockrell,** Institute of Education, *United Kingdom*

The aim of this Symposium is to analyze from different theoretical and methodological perspectives children's production and understanding of representational drawing in different tasks and interactive contexts, with special attention to the sociocognitive and metacognitive processes involved. Achieving a better understanding of the processes involved in children's pictorial production and understanding is intimately related with relevant topics in contemporary research in learning and instruction, such as reference and meaning elaboration; visuomotor skills; cultural learning; symbolic processing; internalization of cultural external representations; conceptual and procedural knowledge; metacognition, knowledge explicitation and representational redescription; or the capacity to represent alternative spatial, temporal and epistemic perspectives. With the intention of going forward in the interaction initiated within the 2005 EARLI Symposium on

children's drawing, we now bring together five studies from five different countries dealing with the development of representational drawing in context, in children in ages 1 to 12.

Emergence of representational drawing in 1- to 3-year-old children
Kyoko Yamagata, Kanazawa University, *Japan*

We analyzed the emergence of representational drawing during the early phases that have classically been named 'scribbling stage' (Luquet, 1927). By adopting a constructive activity viewpoint, we propose an alternative model for the emergence of representational drawing in 1- 3-year-old children. Our studies showed that pre-representational and representational drawings emerge and develop in shared tasks during social and cultural interactions. These results suggested that the development of representational drawing is based on the ability to extract the components of an object and on the acquisition of drawing ability, which allow a child to combine the components into a planned drawing. Although it has been assumed that children develop from the scribbling stage to the schematic drawing stage through fortuitous realism, as Luquet (1927) asserted, we suggest that the development of representational drawing during the so-called scribbling stage is related to symbolic and cognitive function, constructive activity, motor regulation, and sociocultural factors, and that early drawing development involves several stages.

Young children's ability to produce different drawing genres: scientific and narrative
Eva Teubal, David Yellin Teachers' College, *Israel*
Ainat Guberman, David Yellin Teachers' College, Hebrew University, *Israel*

The present study focuses on young children's production of a particular kind of tool: non-verbal graphic texts- namely, two different genres of drawing- narrative and scientific illustration. To the best of our knowledge the specific topic of children's purposeful distinct production of two different drawing genres has not been previously studied. This study was aimed at tackling the question of preschoolers' and kindergarteners' ability to produce two different genres of drawn text (narrative and scientific)- within the framework of ecologically valid tasks, while supported by an adult's mediation. In order to find the answer to that question forty-six preschool and kindergarten children of heterogeneous socioeconomic background aged between 48 – 75 months were individually interviewed twice. They were asked to a) illustrate a story which had been read to them ("drawing from imagination") and b) draw an object present in front of them ("drawing from reality") for their own study purposes. Productions were assessed by student teachers. The order of interviews A and B was counterbalanced among subjects. The drawings were given to 20 student teachers, each categorizing about 12 drawings. Thus, each drawing was classified into either the "scientific" or "narrative" category by 2 – 3 adults. We found even our youngest children were able to produce discriminable drawings representing narrative and scientific illustrations with no age differences. This finding is highly relevant to both learning and instruction, since it points at the potential of drawing as both communicative and representational tool accessible to children from very early stages.

Drawing development and metacognitive processes in early and middle childhood
Giuliana Pinto, University of Florence, *Italy*
Diletta de Bernart, University of Florence, *Italy*

Considering previous studies supporting the strong relationship between cognitive performance and meta-cognitive knowledge in many learning fields, we aim to examine the investigation on the links between metacognitive components, considered both at their conceptual and procedural

level, and drawing development. Study 1 The aim of this study is to investigate the role played by conceptual knowledge on drawing ability when children are exposed to specific experiential training. Participants: 120 children, from 4 to 11 years old, split into two groups: the first group attended specific training in musical or dance education, whereas the other group did not practice any particular activity in these fields. Each child was individually asked to produce drawings related with the training's topic. Results based on the comparison among the performances of 'trained' and 'untrained' groups show a significant improvement of pictorial products of the children attending the training. Study 2 The aim of this study is to examine the relationship between graphic ability and metacognitive awareness of control processes in drawing tasks. Participants were 118 children from 6 to 11 years old. Each child was individually asked to draw a person, keeping up a running commentary of their drawing performance while doing it. Results support the hypothesis that some components of meta-knowledge could influence the drawing ability as the higher pictorial performances were related to high levels of Monitoring and of Evaluation. These results as a whole suggest that an educational context should promote both the knowledge of the drawings' topics and the metacognitive processes involved in child development, providing suitable learning paths to support a complete and complex graphic development.

Drawing a person in childhood: an autobiographical approach
Nora Scheuer, CONICET-Universidad Nacional del Comahue, *Argentina*
Montserrat de la Cruz, Universidad Nacional del Comahue, *Argentina*
Maria Faustina Huarte, Universidad Nacional del Comahue, *Argentina*
Monica Echenique, Universidad Nacional del Comahue, *Argentina*

We explore primary school children's autobiographical accounts of their drawing of a person. In an individual interview, sixty children of heterogeneous socioeconomic background attending primary grades 1, 4 or 7 were requested to illustrate and describe how they used to draw a person in the past (What did you do on paper when you were just beginning to draw a person? What was it like? And before that, had you ever tried?). Children were also asked to illustrate their ways of drawing a person in some intermediate ages and subsequently: Please show me how you imagine you will draw a person next year? Finally: What has changed from this drawing (the earliest) to this one (the latest)? Analysis focused on the changes children marked (orally or graphically) among productions for past ages versus present age, and for present age versus future. Dimensions of change were: stroke control and use of the graphic plane; referential intentionality; body parts and clothes; part-whole relations; dimensional representation; dynamism; specification and expressiveness; drawing spatial perspective; mental world. Factorial Multiple Correspondence Analysis was applied to study associations among categories, temporal contrast, school grade. At all ages, most children marked changes in referential intentionality within the past – present contrast. With increase in age/ school grade, children tended to mark more changes in their drawing history for body parts, clothes and accessories; part-whole relations; representation of dimensions; dynamism; specification and expressiveness; spatial perspective; mental world. Besides, when children were requested to draw a person as they would do next year, most produced a drawing that was more sophisticated in terms of some of the dimensions considered, thus indicating that they were situated in a zone of proximal development. The verbal explicitation of autobiographical changes in drawing a person augmented remarkably in the eldest children's responses.

I 15
30 August 2007 14:30 - 16:30
Room: 1.71 Pócza
Symposium

Learning with dynamic visualizations (Part II): Enhancing the learning experience

Chair: **Huib Tabbers,** Erasmus University Rotterdam, *Netherlands*
Organiser: **Mireille Betrancourt,** TECFA, University of Geneva, *Switzerland*
Organiser: **Katharina Scheiter,** University of Tübingen, *Germany*
Organiser: **Huib Tabbers,** Erasmus University Rotterdam, *Netherlands*
Discussant: **Mireille Betrancourt,** TECFA, University of Geneva, *Switzerland*

With recent technology advances, computers now offer animated graphic devices, which seem attractive and efficient to designers of instructional materials. However, the research carried out so far failed to establish clear and systematic advantages of using animated graphics over static ones on learning. This symposium examines several design features that may influence how much will be learned from dynamic visualizations. Stimulating the learners to involve in relevant cognitive processing and helping them deal with the transient nature of the learning materials are the main goals of the studies presented in this symposium. First, Hegarty and her colleagues tried to optimize learning by giving learners interactive control of a 3D visualization. Another strategy to involve the learner was applied by Wouters, Paas and Van Merriínboer, who made students reflect while studying an animated expert model and varied the transiency of the verbal explanations. The other three studies mainly focused on the perceptual problems of studying dynamic visualizations. First, Arguel and Jamet added screenshots to a video to help students deal with the transiency of information. De Koning and his colleagues on the other hand tried to enhance the effectiveness of an animation by varying its speed. Finally, Meyer, Schnotz and Rasch gave users control over the speed of an animation and used different methods to gain detailed insight in the learning process. Taken together, the results of these five studies provide the instructional designer with guidelines on how the increase the effectiveness of dynamic visualizations. Moreover, the focus on cognitive processes further refines our theoretical understanding of how people learn from these kinds of visualizations.

Spatial thinking with external visualizations: The role of individual differences
Mary Hegarty, University of California, Santa Barbara, *USA*
Madeline Keehner, Curtin University, Perth, *Australia*
Cheryl Cohen, University of California, Santa Barbara, *USA*
Peter Khooshabeh, University of California, Santa Barbara, *USA*
Daniel Montello, University of California, Santa Barbara, *USA*

In a series of experiments, we have examined the role of interactivity and spatial ability in a task requiring participants to infer and draw a cross section through a three dimensional (3-D) object. In some experiments, we manipulated whether participants could interactively control a virtual 3-D visualization of the object while performing the task. An early experiment indicated that interactivity led to improved performance relative to passive viewing, but this benefit disappeared in later experiments we equalized visual input for the two conditions in a yoked pairs design. Spatial visualization ability predicted performance in all experiments. We have also observed

striking individual differences in how people interact with the external visualizations that are related to performance of the cross section task. Our results suggest that when using external visualizations the quality of visual information available to participants is more important than interactive control per se. Interactive computer visualizations can augment performance on spatial inference tasks, but that they do so only for a subset of individuals who can discover how to best use the additional information that they provide.

Effects of modality and reflection in animated expert models
Pieter Wouters, Open University of the Netherlands, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*
Jeroen van Merriënboer, Open University of the Netherlands, *Netherlands*

In animated models, experts explicate how a problem is solved and why a particular method is chosen. When abstract cognitive processes or concepts are involved, dynamic visualizations (i.e., animations) might be beneficial for novices. Cognitive load theory was used to investigate whether reflection could help novices to engage in relevant learning activities. We argued that for complex explanatory text, written explanations would facilitate the selection and organization of words better than spoken explanation and therefore yield more coherent mental representations upon which meaningful reflection is possible. Consequently, we hypothesized that learners with written explanations would yield better transfer performance with reflection prompts, whereas reflection prompts would have no effect with spoken explanations. The results confirmed the hypothesis with transfer performance on the post-test. Implications for the design of animated models are discussed.

Using static pictures associated with dynamic visualizations to improve the learning of procedural documents
Amael Arguel, University of Rennes 2, *France*
Eric Jamet, University of Rennes 2, *France*

Animations offer advantages to present temporal information that involves change over time. But in numerous situations, static displays are as much beneficial and sometimes better (Betrancourt &Tversky, 2000). This fact could be explained by considering the lack of control for the learner while watching animations, and also the transient nature of the animations themselves (Mayer & chandler, 2001; Betrancourt, 2005; Hasler, Kersten & Sweller, 2006). In our study, we test a new way to present dynamic visualizations in order to improve learning efficiency without using control possibilities from the learners. We used videos presenting first aid gestures underneath which still screenshots from the video itself were shown. We have manipulated the dynamism of the appearance of these pictures (i.e. static vs. dynamic) and the frequency of the pictures (i.e. the number of pictures shown). We argue that this kind of presentation could be efficient in terms of learning, especially when the pictures are appearing dynamically near the video because of (1) the transient negative aspect of animation that could be limited and (2) the fact that explicitly pointing out the important moments of a procedural event could improve the understanding of novice learners (Zacks & Tversky, 2003). Our results are relevant to our hypothesis. We can observe an interaction trend between the factors showing an increase of the dynamism effect when the frequency of the pictures becomes higher.

Speeding up or slowing down the animation? The effect of speed on learning outcomes and mental effort
Bjorn de Koning, Erasmus University Rotterdam, *Netherlands*
Huib Tabbers, Erasmus University Rotterdam, *Netherlands*
Remy Rikers, Erasmus University Rotterdam, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*

Animations are transient and often consist of several simultaneously occurring events, so learning from animations will lead to a high cognitive load. In the present study we have tried to manipulate this load by varying the speed of the animation, and hence the time that is available to process all different elements in the animation. Psychology students viewed an animation of the cardiovascular system, followed by a comprehension test and a transfer test. One group studied the animation while the animation was shown at a relatively high speed, and another group studied the animation while the animation was shown at a relatively low speed. Surprisingly, results indicated that studying the animation at a high speed resulted in less mental effort than studying the animation at a low speed. Moreover, comprehension and transfer performance were the same for both groups. From this it was concluded that the speed at which animations are shown might play a crucial role in the efficiency of learning from animations. Moreover, these results raise serious doubts against the widespread belief that showing an animation at a higher speed makes comprehension of the animation more difficult both in terms of cognitive load and learning outcome.

Effects of playing rate on perceptual and cognitive processing of animations
Katja Meyer, Koblenz-Landau University, *Germany*
Wolfgang Schnotz, Koblenz-Landau University, *Germany*
Thorsten Rasch, Koblenz-Landau University, *Germany*

Perceptual and cognitive processes play an important role when learning with visualisations. When learning with dynamic visualisations the speed of presentation is important due to the fluent nature of animations. Aim of this study was to investigate the influence of the playing rate of animations on the salience of dynamic hierarchical levels and on the construction of dynamic mental models when learners differ in prior knowledge. Therefore exploration strategies of learners with high and low prior knowledge were analysed with regard to the correlation between exploration patterns and learning outcomes in self-directed learning from a user-controlled animation of a four-stroke cycle engine. After answering different tests concerning their prerequisites (perceptual ability, spatial ability, physical-technical problem solving, prior knowledge, current motivation) learners were asked to learn as much as they could about the processes shown in the animation. During the learning process control activities of the students were recorded in log-files. Additionally either thinking aloud or eye tracking methods were applied. After the learning phase the acquisition and application of knowledge were tested, and cognitive load and mental effort were assessed. Twenty undergraduate students from our university were tested. On the basis of the thinking aloud protocols and eye movements the process of mental model construction was analysed. First results indicate that the playing rate of animations had a strong influence on perceptual processing and thus, on higher order cognitive processing. According to our assumptions, dependent on the speed of the animation different aspects become more or less salient. From the perspective of multimedia learning it is crucial to find out the optimal presentation speed for dynamic visualisations in order to emphasise different hierarchical levels of animations and thus, support the construction of adequate dynamic mental models.

I 16
30 August 2007 14:30 - 16:30
Room: 2.54 Novobátzky
Symposium

Sustaining postgraduate student learning: threshold concepts, conceptual thresholds and communities

Chair: **Gina Wisker,** University of brighton, *United Kingdom*
Organiser: **Gina Wisker,** Univesity of Brighton, *United Kingdom*
Discussant: **Erik Meyer,** university of Durham, *United Kingdom*

This symposium focuses on ways we might support and sustain the development of postgraduate student learning, using theories of threshold concepts, conceptual thresholds and communities of practice. Margaret Kiley's paper looks at learning leaps for postgraduates crossing conceptual thresholds, while Gina Wisker and Gillian Robinson take this process into the specific disciplines and threshold concepts of art and literature. Vernon Trafford and Shosh Leshem explore how stages of the PhD process can support conceptual levels of research, and Miri Shacham and Yehudit od-Cohen consider the role communities of practice play in such support. Each paper focuses on issues of development of conceptual levels of research and understanding, and on building and sustaining research communities which have an impact on their society.

Conceptual thresholds for research candidates
Margaret Kiley, ANU, *Australia*

What is it that supervisors of research candidates consider to be the particular conceptual issues that research candidates have difficulty coming to terms with and understanding? Do those concepts differ by discipline in the same way as they do at the undergraduate level? This study has involved research supervisors responding to the following questions: · Please briefly describe the main conceptual issue that you find your research candidates seem to struggle with most during candidature e.g. the idea of an original contribution to knowledge, a conceptual or theoretical framework. · Please note any strategies that you have found effective in assisting your students to come to terms with that issue. The responses have been analysed by discipline and by main concepts e.g. originality, theoretical framework. Furthermore the strategies that the supervisors reported as being successful in addressing the conceptual understanding have been analysed and will be reported in this presentation.

How might we encourage postgraduate students of literature and art to cross conceptual thresholds and achieve threshold concepts in their research?
Gillian Robinson, Anglia Ruskin University, *United Kingdom*
Gina Wisker, University of Brighton, *United Kingdom*

For research for PhD and beyond, students' work needs to move beyond fact finding to conceptual levels which problematise, questions fixed 'truths', enhance deep learning, and make a contribution to knowledge at a conceptual level. There are many ways in which we might support students in crossing this threshold, making this leap, including research development programmes, supervision, feedback, the use of peer groups among others. This paper focuses in particular on students working in literature and art as specific examples of postgraduate research. The paper is underpinned by Meyer, Land and Cousin's work on notions of conceptual thresholds and

troublesome knowledge and builds on previous work (Wisker, Robinson, Trafford Leshem, Lilly, Warnes, 2004, Kiley et al) on postgraduate student learning and the roles played by research development programmes, peer groups, supervisory dialogues and relationships in encouraging metalearning, and the development of understanding of threshold concepts as well as the crossing of conceptual thresholds, the one related to the discipline area, the other to the postgraduate level and stages of the student's work (Kiley and Wisker, 2006). In reporting on this early work on postgraduates, this paper focuses on research carried out with PhD students and their supervisors into the crossing of the conceptual threshold, the development of conceptual level research in particular in relation to literature and art.

The Israeli PhD programme as a community of practice
Miri Shacham, Carmiel College, *Israel*

This paper explores the development and maintenance of communities of practice supporting part time PhD students working at a distance. It considers how communities of practice operate, and how the specific communities of practice of this series of PhD cohorts have both supported and enhanced the development of individuals' research through to successful completion, and have further developed and sustained research communities beyond the PhD itself, leading in several cases also to sustained social impact. In addition to the students' learning in the workshops of the PhD programme, active learning progresses in two main channels: 1. Small support groups sustaining learning meetings in Israel 2. Activities offered by the Graduates' Forum in Israel. Studt das a graduate forum and symposia which bring together current and previous PhD students, sessions being led in the main b graduates of the programme. One key issue is the impact these students continue to make in the economy and society because of their research when implemented and thus they continue to work with, build and extend their communities of practice and make a significant contribution to society.

Doctorateness and Threshold Concepts
Vernon Trafford, Anglia Ruskin University, *United Kingdom*

Making 'original contributions to knowledge' involves doctoral candidates conceptualising their findings within cogently argued theoretical perspectives. Doctoral supervisors and examiners are 'implicated' in this model of research activity. However, our presentation will focus only on doctoral candidates, showing how they encounter difficulties in learning about and using conceptualization. We will argue that doctorateness represents a threshold concept for doctoral candidates. Our data draws on extensive supervisory and examining experience, observations, participation and documents from conducting international workshops for supervisors and candidates, plus a recent survey of 55 current and recent graduates (Trafford and Leshem, 2006). Candidates' accounts will illustrate: 1 how candidates address restrictions to their learning; 2 seek to learn about and gain competence in conceptualising; 3 recognise the need for doctorateness in their research; 4 gain doctorateness and conceptualization in their research. Thus, this evidence will explain how doctorateness is dependent upon explicitly presented levels of conceptualization in doctoral theses. Our contribution will illustrate: 1 how candidates acquire/develop an understanding of 'conceptualising;' 2 what difficulties were met and overcome in the process of 'acquiring' that understanding; 3 how understanding the nature of conceptualising helped candidates to undertake their research; 4 how conceptual insights were used by candidates in their research. We will show how doctoral candidates develop personal strategies to incorporate conceptualization in their research as '… a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress' (Land and Meyer, 2006:4).

I 17
30 August 2007 14:30 - 16:30
Room: 0.100D
Symposium

Research on digital video and teacher learning

Chair: **Ellen van den Berg,** University of Twente, *Netherlands*
Organiser: **Ellen van den Berg,** University of Twente, *Netherlands*
Organiser: **Niels Brouwer,** Radboud University Nijmegen, *Netherlands*
Discussant: **Francois Tochon,** University of Wisconsin-Madison, *USA*

Digitization has made the use of video considerably more versatile than its predecessor analog video. The rapid development of ICT technology has introduced a promising new tool to teacher education. As became clear since the microteaching movement began, visualizing teaching competence has the advantage of making teacher-learner interactions, their complexity and subtlety explicit in authentic and subject-specific ways. These days, DV is being integrated in electronic learning environments and CSCL programs enable teachers to upload, view, review and comment on visual representations of their own and each others' teaching. Using multimedia cases in electronic learning environments may help prospective as well as experienced teachers to "learn to notice" what are important events and actions in their everyday work and to relate these to broader pedagogical principles (Van Es & Sherin, 2002). DV as a new tool for professional inquiry and learning should help teachers to change and expand their teaching repertoires and to use professional knowledge as a basis for deciding how to act in specific situations. It should help them to relate practice and theory in far more powerful and effective ways than was possible in the era of analog video (Schlager & Fusco, 2003). In the face of such hopeful perspectives, one cautious empirical question is whether teachers actually learn when using DV. And if teachers do so, how and under what conditions do they learn? Bearing on these broad questions, this symposium will provide opportunities to compare and exchange different perspectives and recent findings from around the world. If the new DV tools are to benefit teachers' professional learning, they need to be implemented in evidence-based ways. Empirical research about the role of DV in teacher learning is necessary to advance scientific knowledge and inform practice in the field of teacher education.

Teacher learning with digital video. Purposes and conceptualization
Ellen van den Berg, University of Twente, *Netherlands*
Niels Brouwer, Radboud University Nijmegen, *Netherlands*

The rapid development of multimedia technology holds promise for creating rich learning environments which support authentic, active and collaborative learning among teachers. Teachers may benefit from using such environments to better cope with the challenges they face in their complex professional practice. The purposes of implementing multimedia cases in teacher education are directed at four types of learning outcomes in teachers, which can be characterized with the words: think, act, reflect, transfer. The authors proposing this symposium are undertaking an international review of empirical studies relevant to these questions. This evidence will be summarized under four themes: 1. Learning results of prospective and experienced teachers from using DV 2. Visual learning by teachers 3. Collegial cooperation using DV 4. CSCL environments built around DV This first contribution to the symposium is conceptual in nature and will provide a summary of a literature review on the rationale behind multimedia cases from a perspective of

the learning sciences. Moreover, a framework is presented to organize studies of the use of digital video and multimedia cases in teacher education. The next four contributions are empirical studies, each addressing one theme. Theme 1: Massler e.a. Theme 2: Miller et al. Theme 3: Brouwer Theme 4: Krammer et al. Finally, the discussant will be invited to present a synthetic comment on the symposium contributions.

Learning from the experience of others: Effects of culture and task on what viewers might learn from watching classroom video.
Kevin Miller, University of Michigan, *USA*
Xiaobin Zhou, University of Michigan, *USA*
Linda Sims, University of Michigan, *USA*
Michelle Perry, University of Michigan, *USA*
Fang Ge, University of Michigan, *USA*

Digital video methods have enormous power to capture the complexity of classroom processes and make it accessible to those learning to teach. As with any complex material, however, what one learns from watching classroom video depends in part on the cultural beliefs one brings to the task and the cognitive activity one engages in while watching. We will discuss reasons that classroom video materials can be both compelling and difficult to learn from, and present research on how cultural characteristics and viewing tasks affect what viewers learn from watching classroom video. American and Chinese viewers tend to notice different aspects of the same videotaped mathematics lesson. American viewers, both teachers and college students, were more likely to attend to teacher characteristics. These kinds of attributes can be judged after only very brief presentations. Simple changes in viewing tasks, though, can lead viewers to attend to characteristics of instruction rather than the instructor. These studies indicate both the need for and the possibility of a cognitively-based pedagogy of classroom video.

Teacher peer coaching using digital video
Niels Brouwer, Radboud University Nijmegen, *Netherlands*

In this paper, first results are presented from an evaluation of a peer coaching project using digital video, carried out with experienced teachers in secondary education. Qualitative as well as quantitative data were collected among two consecutive cohorts of participating teachers. The findings indicate what learning results teachers attributed to their participation in terms of new teaching ideas discovered as well as changes brought about in their teaching practices. The most prominent result of participating in the project was that the teachers achieved increased the variation in their teaching behaviors. Another important finding is that voluntary participation and personal ownership in choosing one's partner to work with in a pair, one's learning goals and focus for experimenting in the classroom were considered important conditions for productive work.

Effects of classroom video-analysis on teacher knowledge – results of the evaluation of a web-based professional development program with videos
Kathrin Krammer, University of Zurich, *Netherlands*
Claudia Lena Schnetzler, University of Zurich, *Switzerland*
Nadja Ratzka, University of Zurich, *Switzerland*
Christine Pauli, University of Zurich, *Switzerland*

Stimulated by new technological possibilities as well as by video-based instructional research, the use of classroom videos in teacher education is receiving a great deal of attention. From the perspective of educational psychology the use of classroom videos is of great importance for the construction and the extension of teaching-related knowledge and teaching strategies. We examined the effectiveness and conditions of learning with classroom videos in a yearlong bi-national in-service teacher professional development program. In online and face-to-face sessions, 20 teachers from Germany and Switzerland analyzed videos of their own math-lessons and those of other teachers and discussed them in groups spanning across the two countries. Main focus of teachers' analysis of the classroom videos was students' thinking and cognitive activation. Using different instruments, the effects on the professional development of the participating teachers were evaluated. Information about teachers' learning processes, about the acceptance and the effectiveness of the training measured by the change of cognitive-instructional beliefs was collected. To assess the teaching-related knowledge, two surveys with classroom videos were implemented both at the beginning and the end of the professional development. The analysis of teachers' comments on the classroom videos reveals a change as well in the form as in the content and quality of these comments. The effectiveness of the professional development with classroom videos in terms of changes in teachers' knowledge will be shown and discussed in our presentation.

I 18
30 August 2007 14:30 - 16:30
Room: 1.60
Symposium

Alternative methods for assessing school effects and schooling effects

Chair: **Hans Luyten,** University of Twente, *Netherlands*
Organiser: **Pieter Verachtert,** Catholic University of Leuven, *Belgium*
Organiser: **Hans Luyten,** University of Twente, *Netherlands*
Discussant: **Pamela Sammons,** University of Nottingham, *United Kingdom*
Discussant: **Jürgen Baumert,** Max Planck Institute for Human Development, *Germany*

The impact of student intake measures on school performance has traditionally been a matter of primary concern in the field of school effectiveness research. However, school effectiveness research has thus far focused strongly on differences between schools with regard to the achievement levels of their students. Since the publication of the Coleman Report, the term 'school effect' and the percentage of variance in achievement scores situated at the school level have become synonymous in the research literature on school effectiveness. Basically, the schools whose students get high achievement scores are considered to be the most effective ones. There is a widespread consensus among school effectiveness researchers that controlling for prior

achievement is indispensable if schools are compared on this basis. Other background characteristics like SES, ethnicity and gender may be taken into account as well. In fact, effectiveness is defined in terms of that part of the achievement not predicted by prior achievement. Goldstein (1997) has noted that in standard school effectiveness research estimates of a school's effectiveness are always based on its relative position in comparison with other schools. To what extent a school appears to be effective is thus largely determined by the performance of the other schools to which it is compared. In the UK, the attainment of literacy and numeracy strategies at age 11 has improved substantially since 1998, but still significant variation between schools is found in value added analyses because these relative measures are not equal in all schools. If effectiveness were gauged using an absolute measure one would expect to find a decreasing percentage of ineffective schools and/or an increasing percentage of effective schools. The presentations in this symposium report examples of studies based on alternative research methods to assess the effectiveness of education.

School effects on students progress: A dynamic perspective
Simone Doolaard, University of Groningen, *Netherlands*
Roel Bosker, GION, Groningen University, *Netherlands*
Henk Guldemond, GION, Groningen University, *Netherlands*

School effects are usually within the range of 10 to 20 percent explained variance in student outcomes whilst controlling for intake differences between schools. The type of design usually employed in this type of research is of a cross-sectional nature, with a model that has strong resemblance with the analysis of co-variance, albeit within a multilevel framework. A different approach, that has been advocated already in the early nineties by Raudenbush, is to look at growth trajectories of students, and the contributions that schools have in this respect. The present paper is exploring the potential of this approach. Leading questions are: 1. how much do schools contribute to the growth of students during primary education; 2. and are the results for language and arithmetic comparable? 3. are contextual factors (student body composition) related to these school specific growth differences? To study this question a longitudinal design was employed, with students from over 100 Dutch primary schools being tested in the field of language and arithmetic. Initial explorations showed that using a logarithmic transformation of the proficiency scores and then fitting a polynome of the second degree produced the best results. Schools then appeared to contribute to over more than a half of the variation in language growth and to one third of the variation in arithmetic growth. The differences, however, relate more to the precise form of the trajectory rather than to the resulting differences in grade 8 performance. Further analyses revealed that contextual effects, even when controlling for IQ-differences between students and schools, appeared to be present, although schools are given extra resources to compensate for a disadvantageous composition of the student body. Implications for future research both in the area of school effectiveness and in the area of equal opportunities in education are discussed.

Assessing school effects without controlling for prior achievement?
Hans Luyten, University of Twente, *Netherlands*
Peter Tymms, CEM Centre, Durham University, *United Kingdom*
Paul Jones, CEM Centre, Durham University, *United Kingdom*

Multilevel modelling, which is the standard method for assessing the 'school effect' in educational effectiveness research, is combined with the regression-discontinuity approach in this study. While multilevel modelling yields only estimates of relative teacher and school effects, the regression-discontinuity approach allows the assessment of the absolute effect of schooling (schooling vs. no

schooling). A combination of both approaches yields an estimate of this absolute effect and its variation between teachers and schools. The research findings presented in this article illustrate how the "value added" of schooling can be assessed empirically using cross-sectional data. Application of the regression-discontinuity approach within a multilevel framework produces both an estimate of the absolute effect of one year schooling and an estimate of the variation across schools of this effect. In the study reported here the approach was applied to both a cross-sectional and a longitudinal data set. The research findings are very similar for both data sets.

The contribution of schooling to the cognitive development of secondary education students in Cyprus: an application of regression-discontinuity with multiple cut-off points
Leonidas Kyriakides, University of Cyprus, *Cyprus*
Hans Luyten, University of Twente, *Netherlands*

This article reports the results of a study in which the basic regression-discontinuity approach is extended. A model with multiple cut-off points is fitted. In addition the paper investigates the extent to which the measure of the effect of schooling depends on the criteria used for measuring school outcomes. Specifically, the paper presents the results of a study which examines the effect of schooling on secondary student development of five domains of reasoning (i.e., categorical, quantitative, spatial, causal, and propositional). The Comprehensive Test of Cognitive Development was administered to students of the six grade groups of secondary schools and a design with multiple cut-off points was applied. Data on mathematics and language achievement in curriculum-based tests were also used to measure the effect of schooling. Finally, implications of findings for the development of educational effectiveness research are drawn.

A seasonal perspective on school effectiveness: Evidence from a Flemish longitudinal study in kindergarten and first grade
Pieter Verachtert, Catholic University of Leuven, *Belgium*
Jan Van Damme, Catholic University of Leuven, *Belgium*
Patrick Onghena, Catholic University of Leuven, *Belgium*
Pol Ghesquiere, Catholic University of Leuven, *Belgium*

Since the seminal work of Barbara Heyns (1978), a limited number of studies have attempted to assess the unique contribution of schooling to children's cognitive achievement by comparing their learning rates during the school year and the summer vacation. These studies invariably found significantly faster learning rates during the school year as compared to the summer, thereby adding to the evidence of an absolute effect of schooling. Whereas most of these studies indicate that schooling has an attenuating effect on the growth of the achievement gaps between different socioeconomic groups, there is considerably less consensus on the effect of schooling on other (e.g. racial/ethnic) achievement gaps. In this study, we use multilevel piecewise growth curve modelling to analyse growth in mathematical skills throughout kindergarten and first grade in a sample of more than 3500 Flemish children. First, the learning rates during the school year are compared with the learning rates during the summer. Second, we investigate whether schooling has a positive effect on the achievement gaps between children from different socioeconomic, racial/ethnic and linguistic backgrounds. Third, we examine to which extent differences between schools in learning rates during the school year and during the summer can be accounted for by school characteristics such as group composition.

The effect of schools on the motivation toward learning tasks and the academic self-concept: A multivariate multilevel latent growth curve model
Eva Van de gaer, Catholic University of Leuven, *Belgium*
Bieke De Fraine, Catholic University of Leuven, *Belgium*
Heidi Pustjens, Catholic University of Leuven, *Belgium*
Jan Van Damme, Catholic University of Leuven, *Belgium*
Agnes De Munter, Catholic University of Leuven, *Belgium*

The main objective of the present study is to gain more insight into the effect of schools on the development of two non-cognitive student outcomes, namely, the motivation toward learning tasks, and the academic self-concept, and, on the relationship between these two developmental processes. Data were drawn from the LOSO-project and consisted of 2687 students in 50 schools that were tested repeatedly at four different time points during secondary education (Grades 7-12). A multivariate multilevel latent growth curve model was used to analyze the data. This model estimates quadratic growth trajectories of the two outcomes simultaneously, which has the advantage of examining the associations between the growth parameters of the outcomes. Moreover, a school-level was included that allows the investigation of the effect of schools on the two development processes and on their interrelation.

I 19
30 August 2007 14:30 - 16:30
Room: 0.81 Ortvay
Symposium

Teacher learning through coaching and mentoring: Individual and contextual issues

Chair: **Fritz C. Staub,** University of Fribourg, *Switzerland*
Organiser: **Fritz C. Staub,** Fribourg, *Switzerland*
Discussant: **Frances Rust,** New York University, *USA*
Discussant: **Sharon Derry,** University of Wisconsin-Madison, *USA*

Given the crucial role of education in today's world and the vast amount of resources it necessitates (OECD, 2006), the development and research based understanding of effective learning environments for teachers to acquire and develop teaching expertise is of pivotal importance for educational sciences. In an era in which educational reform focuses increasingly on teacher quality it is essential that we can identify and foster the conditions that will optimize teacher learning. Traditional forms of professional development-such as short-term workshops and traditional forms of teacher training have increasingly been found to be inadequate for the advancement of effective and high quality teaching practices (Huberman, 1995; Hiebert, Gallimore and Stigler, 2002). Current theories of teachers' professional development draw on sociocultural and cognitive theories of learning (Putnam and Borko, 2000; Lave and Wenger, 1991; Rogoff, 1990) to emphasize creating the conditions in schools for teachers to engage in on-going learning and reflection on their practice with the assistance of more knowledgeable 'others' (coaches, mentors, and/or other teachers). This symposium brings together research on mentoring and coaching in pre-service teacher education and professional development from five countries (England, Ireland, the Netherlands, USA, and Switzerland). The goal of the symposium is to

examine individual and contextual aspects of teacher learning as well as their interaction in mentoring and coaching by drawing upon cognitive and socio-cultural theories of learning. Two of the studies focus on subject matter specific coaching and the other three focus on more generic aspects of mentoring. The individual papers and the symposium encompass examples of how different conceptions of learning provide different affordances and constraints in terms of how we understand and enhance mentoring and coaching. The studies furthermore contribute to our research-based knowledge on the design and assistance of effective teacher learning.

Stimulating teachers' learning on the work place by peer coaching
Theo C. M. Bergen, University of Nijmegen, *Netherlands*

Powerful learning and instructional arrangements are sought to stimulate teachers' learning on the work-place. Methods of collegial coaching (e.g. peer- coaching) are seen as powerful interventions as these can stimulate teachers to reflect what constitutes good teaching. Two intervention studies were carried out with coaching as a central element. The results of the studies were ambiguous. We decided to take a closer look into the coaching dialogues. 45 peer coaching dialogues were audio taped and transcriptions were made. The transcriptions were analyzed from three different perspectives: a procedural perspective related to the recommended phases during the coaching conference, a coaching specific perspective related to the five specific functions of successful coaching and an instructional content perspective related to teaching for active learning, which is discussed or proposed by the coach or teacher. Between the coaching dialogues are remarkable quantitative and qualitative differences in respect to the three perspectives we used in our analyses. In conclusion peer coaches could create potentially a powerful learning environment for their colleagues, but the powerfulness depends of the quality of the coaching dialogue.

Transforming mentor teachers' beliefs on teaching mathematics while learning to coach
Fritz C. Staub, University of Fribourg, *Switzerland*
Annelies Kreis, University of Teacher Education Thurgau, *Switzerland*

The nature of pedagogical content beliefs matters for what teachers do in their classrooms as well as for student achievement gains. In elementary mathematics a cognitive constructivist orientation is associated with larger achievement gains in mathematical word problems than an associationist view of learning and teaching (Staub & Stern, 2002). Teachers' beliefs, however, are resistant to change. For teacher education it is thus a pivotal issue, how mentor teachers' beliefs can be developed. In a quasi-experimental study in Switzerland an intervention group (NIG=15) of mentor teachers (grade 1-6), who regularly cooperate with a university of teacher education, learned to assist student teachers on the basis of Content-Focused Coaching (West & Staub, 2003). Integrated into learning to do content-focused coaching mentors discussed and refined their pedagogical content knowledge in mathematics. The intervention included 50 hours of course attendance plus 70 hours of individual study and cooperation with peers over the duration of 15 months. Mentor teachers in the control group (NKG=10) participated in the regular professional development only. All mentor teachers answered a questionnaire before and after the intervention. The questionnaire included belief scales on teaching mathematics. For two of these scales, "Selecting Cognitively Activating Tasks," and "Active Social Construction of Understanding," the statistical interactions between time of measurement (before and after intervention) and group (intervention vs. control group) reached statistical significance ($p < .05$). The study demonstrates that mentor teachers' pedagogical content beliefs can be changed towards a more cognitive constructivist view through their participation in a course on learning how to coach student teachers with a focus on pedagogical content knowledge.

Developing the organizational capacity necessary to support effective coaching: Results from year 1 of a longitudinal study of the influence of Content-Focused CoachingSM on reading comprehension

Donna D.D. Bickel, University of Pittsburgh, *USA*
Lindsay Clare Matsumura, University of Pittsburgh, *USA*
Lauren B. Resnick, University of Pittsburgh, *USA*
Brian W. Junker, Carnegie Mellon University, *USA*
Kathleen Young, University of Pittsburgh, *USA*

This paper will present findings from the first year of a four-year experimental study funded by the US Institute for Educational Studies to examine the influence of Content-Focused CoachingSM (CFC) (Staub, West, & Bickel, 2003) on reading comprehension instruction and student learning in grades 4 and 5. While the ultimate goal of the study is to investigate the effectiveness of this particular model of coaching for improving instruction and student learning, we do not expect to see significant effects on teaching and learning at this early stage of the project. Instead our goals for this first year are to collect baseline measures of instruction and learning, introduce CFC conceptual tools and ways of working to multiple role groups (teachers, coaches, principals, district administrators) and begin to develop the organizational capacity needed at the school and district level to support the work of the CFC coaches. Specifically, the aim of this presentation is to describe the methods used to influence how coaching is perceived and to what extent it is positioned as a powerful component of a coherent professional development system within a district. How coaching is perceived and positioned in the early stages of the work are critical factors in its potential to effect ongoing learning and improvement.

Re-configuring pre-service teacher education: Developmental Work Research as a methodology for teacher educators' expansive learning

Viv Ellis, University of Oxford, *United Kingdom*
Anne Edwards, University of Oxford, *United Kingdom*

This paper reports on the methodological framing of a research and development project with teacher mentors in pre-service teacher education at Oxford University. The project ('DETAIL') aims to re-configure the partnership between the university and schools at a more collective level and to develop 'collaborative professional inquiry' as a systemic tool in the professional learning of participants (intern teachers, their mentors, the secondary school subject department, and the university-based lecturer). The paper argues that the methodological framework for researching this development with the school- and university-based teacher educators – Developmental Work Research and the concept of 'change laboratories' (Engestrßm 1991) – offers a powerful means of both working on and understanding the processes of change. It can achieve this by re-focusing analysis culturally and historically at the systemic rather than the individual level and by using the tools of Activity Theory to support the learning of the 'change agents'. Further, the paper argues that this methodology has the potential to produce more 'socially robust' scientific knowledge (Gibbons 1999) by bringing together in a dialectic the practice-driven redesign of teacher education processes and the ideas-driven construction of visions for the future.

I 20
30 August 2007 14:30 - 16:30
Room: 1.58
Symposium

Grounding faculty development in an evidence-based theory

Chair: **Alenoush Saroyan,** McGill University, *Canada*
Organiser: **Mariane Frenay,** Universite catholique de Louvain, *Belgium*
Organiser: **Alenoush Saroyan,** McGill University, *Canada*
Discussant: **Kirsten Lycke,** University of Oslo, *Norway*

The general perception that university teaching does not require any expertise is still very much alive despite a well established tradition of faculty development in most North-American and some European universities. This can be explained by the fact that faculty development until now has, to a large extent, been an 'a-theoretical' activity. The observation that only few formal training programmes exist throughout the world that train faculty developers and that most people active in the field develop their interest in this area through diverse careers in and out of academia, explains why faculty development until now still is very much influenced by the 'ad hoc' paradigm (Light, 2003) in which university teachers gain expertise by trial and error. In order to further strengthen this field, we set out to develop a comprehensive framework that could be used to design, implement and assess faculty development initiatives. We found justification in this undertaking on several counts.. First, there is a vital need for a better understanding of what faculty development involves and how one can build an effective faculty development practice. Such a model should offer an inclusive framework for analysing practices across diverse institutional contexts. Second, a conceptual model can support the evolution of faculty development, both as a field of practice as well as an area of scholarship and research by guiding the initial and continuing education of faculty developers and by providing the context for framing research questions. Third, a valid framework can be used for organising external evaluations and reviews of educational units, their strategies and activities. In the symposium we will present this model and describe the comparative research process which led us to this development. We will also discuss the outcome of quantitative and qualitative approaches we have taken to date to validate the model.

A comparative study of faculty development in Europe and North-America
Mariane Frenay, Universite catholique de Louvain, *Belgium*
Alenoush Saroyan, McGill University, *Canada*
Jean-Jacques Paul, Universite de Bourgogne, *France*
Anette Kolmos, Aalborg University, *Denmark*

Building on a 3-year mobility project between seven institutions from Canada and Europe, this paper will outline, from the comparison of 5 countries, how faculty development has developed and is now implemented in those specific contexts. Results of these comparisons show how diverse and evolving the field is at present time, not only regarding the level of experience and expertise reached, but also regarding the way it is organised as a result of complex influences of both institutional and national levels. This paper describes past events that gave rise to faculty development practice in those countries and the current contextual factors that are contributing to the development and practice of faculty development. We will provide an overview of structures

and programs across the countries and discuss some of the challenges that will shape the future of faculty development practice and scholarship.

A conceptual framework for faculty development
Nicole Rege-Colet, Universite de Geneve, *Switzerland*
Lynn Taylor, Dalhousie University, *Canada*
Mieke Clement, Katholieke Universiteit Leuven, *Belgium*

In response to the increasing public expectations concerning the quality of higher education an emerging group of academic professionals are engaged in a wide range of activities that come under the rubric of faculty development. The comparative paper presented in this symposium clearly illustrates how diverse the field is at this moment, not only regarding the level of experience and expertise reached, but also regarding the conceptualisation of what faculty development entails. In this paper we describe a conceptual framework based on an international comparison of a wide range of faculty development activities carried out in higher education institutions of five countries, informed by the existing literature on faculty development and the shared expertise of academics and professionals participating in this symposium. By taking both a theoretical and practical approach to understanding, researching, and developing faculty development, it is possible to conceptualize the dimensions of development that cross cultures, institutions, and disciplines. Based on this comprehensive conceptualization of the faculty development role, valid approaches to designing, implementing and evaluating the impact of faculty development can be designed. As such, this comprehensive framework does not only help to understand and analyse faculty development, the framework also helps to further develop the field as it articulates the foundations of professional knowledge and practice in the field of educational development for higher education

Conceptual validation of the conceptual framework
Denis Bedard, Universite de Sherbrooke, *Canada*

Higher education institutions in many countries are facing new challenges that are causing them to address issues related to the quality of teaching and learning. This concern has encouraged institutions to create special faculty development units charged with building institutional teaching and learning capacity. However, in spite of the abundant literature about faculty development and practice experience spanning several decades in some countries, the field of faculty development remains ill-defined. As a result, neither the definition of the field nor the underlying principles of faculty development practice are clearly set. In an effort to better define this field of practice and inquiry, a conceptual framework has been proposed by a group of practitioners and researchers from 8 different universities, located in Europe and in Canada (see papers 1 and 2). This conceptual framework has been "put to the test" recently with faculty developers (practitioners) in Europe. It will undergo a similar process in the spring of 2007 with practitioners in Canada. Finally, another validation step will take place in February and March 2007 with a group of experts from different parts of the world. This paper will present the methodology and results from these three instances of inquiry representing the validation process that has been put in place.

Academic developers across Europe: what's in a name? A comparative analysis
Roberto Di Napoli, Imperial College London, *United Kingdom*
Heather Fry, Imperial College London, *United Kingdom*
Marta Fernandez-Villanueva, University of Barcelona, *Spain*
Begona Gros, University of Barcelona, *Spain*
Johannes Wildt, Dortmund Universität, *Germany*
Piet Verhesschen, Katholieke Universiteit Leuven, *Belgium*
Veerle Hulpiau, Katholieke Universiteit Leuven, *Belgium*
An Verburgh, Katholieke Universiteit Leuven, *Belgium*
Mariane Frenay, Universite catholique de Louvain, *Belgium*

Paper 4 will present the findings of a two-year, joint research project conducted in five European universities. The project arose from interest in investigating the identities and roles, in different parts of Europe, of those called, in a generically used term, educational developers. At a time of change in higher education systems in the European space and the resulting emphasis on teaching, educational developers have become important actors in the life of universities. However, their presence and position within university life is often complex and contested. Universities have been ruled traditionally by the unspoken notion of 'academic freedom' and been resistant to activities that might impair this notion. Universities have been considered primarily as centres of scholarship and research. Educational developers have consequently found themselves in the challenging position of both upholding teaching and mediating between institutional forces in favour of change and traditional ones that have frequently left teaching unscrutinised. We asked ourselves 'who is an educational developer, and why, and how do educational developers regard themselves, their role and development, and how might these considerations illuminate our understanding of educational development?'. Such questions are starting to be asked within nations but not across national boundaries. Our project offered the opportunity to become familiar with different institutional contexts of educational developers and the impact these have on the professional identity of educational developers and their role within their own institution. Our transnational, interview-based research sought to unpick this sense of challenge and estrangement that has often led educational developers to ask themselves questions of a professional nature but also of an ontological one. A general introduction to the project will be followed by the presentation of the results in the participating institutions.

I 21
30 August 2007 14:30 - 16:30
Room: 7.59
Symposium

Online reflective dialogues: Integrating social and cognitive dimensions

Chair: **Rupert Wegerif,** University of Exeter, *United Kingdom*
Chair: **Baruch Schwarz,** Hebrew University of Jerusalem, *Israel*
Organiser: **Rupert Wegerif,** University of Exeter, *United Kingdom*
Discussant: **Steve Higgins,** University of Durham, *United Kingdom*
Discussant: **Paul A Kirschner,** Utrecht University, *Netherlands*

Computer supported collaborative learning has long been seen as a good way to teach thinking through argumentation. However some argumentation schemes have proved too narrowly cognitive to capture the way in which social dynamics impact upon the quality of shared thinking in online environments. The papers in this symposium all explore different ways of going beyond the cognitive tradition in studies of online reflective dialogues. In different ways they illustrate the importance of what has been called 'social meta-cognition' or the awareness of participants in dialogues of how social processes impact upon their shared learning and thinking. Wegerif and De Laat argue that thinking occurs in a 'dialogic space' that can be opened, widened and deepened by technology. They illustrate how this approach can impact on the design of tools and pedagogy to support reflective dialogues online. Schwarz reports on a study of using an online tool to support reflective dialogue within a classroom where the use of the tool led to a change in the social relationships of the classroom in a way that impacted positively on the quality of shared learning and thinking. Andreissen and Baker explore the inter-relationship between group problem-solving online and a process cycle of the tension and relaxation of social relationships suggesting that affect and cognition are intrinsically connected. Näykki and Järvelä, like Wegerif and De Laat, look at tools that support reflection, in this case focusing on the use of pictorial knowledge representations which, they show, serve the double function of supporting greater reflection on and so understanding of knowledge contents while also structuring social interactions that support the construction of knowledge.

A networked dialogic learning design framework for teaching thinking
Rupert Wegerif, University of Exeter, *United Kingdom*
Maarten de Laat, University of Exeter, *United Kingdom*

'Higher Order Thinking Skills' and meta-cognition have traditionally been conceptualised primarily from the perspective of individualistic psychology as properties of individual minds. From this perspective engagement with computers, particularly programming languages and simulations, has been seen as a way of promoting higher order skills and strategies. Increasingly, however, thinking and learning have been conceptualised in more socially situated ways, as the properties of communities of practice for example, and technology enhanced learning has been designed to support social and communicative practices. Often this shift in perspective from a focus on the individual mind to a focus on socially situated practice has meant that the pedagogical goal of teaching for higher order thinking has been rejected as no longer appropriate. In this paper we argue that, accepting the shift away from individualistic cognitive psychology towards

understanding socially situated practices, it is still possible, to preserve the pedagogic aim of teaching for higher order thinking and learning skills, as a way to improve the quality of social learning and to design technology enhanced learning environments to promote these skills. First we argue for a re-conceptualisation of higher order thinking and learning skills as primarily a property of dialogues within networks elaborating on the importance of 'creative dialogic reflection' as the highest of higher order thinking skills and the importance of 'social meta-cognitive awareness' which enables participants in dialogues to scaffold their own and others learning and thinking. We then illustrate the value of this theoretical perspective for technology enhanced pedagogy through three studies of the design and evaluation of tools that both open spaces for dialogic reflection and facilitate the emergence of social meta-cognition.

Pedagogical principles in education for critical thinking based on CSCL tools
Baruch Schwarz, The Hebrew University of Jerusalem, *Israel*

Many programs have been developed to foster critical reasoning in classrooms. The ontological shift that moved reasoning from an individual cognitive activity to a participatory activity, and the development of new technological tools that make explicit processes and products, brought new hopes and new challenges in education to critical reasoning. Through the description of efforts done by our team to use CSCL (Computer Supported Collaborative Learning) tools to foster critical reasoning and argumentation, we list several principles concerning the new role that the teacher plays or should play in this endeavor. We will show that the teacher should mediate and orchestrate various argumentative practices and that particular emphasis should be put on transitions between argumentative activities on the same topic with different motives and on ethical aspects of communication

Socio-cognitive tension and relaxation: an analysis of the maintenance of a collaborative working relation in multi-channel computer-supported problem-solving
Jerry Andriessen, University of Utrecht, *Netherlands*
Michael Baker, CNRS & University Paris X, *France*

When people work together — for example in order to plan a holiday, make a meal, fix a car or solve a maths homework problem — they not only have to contribute to achieving the task at hand (e.g. by proposing a holiday destination, asking for the food mixer or checking a calculation) and to regulate their joint activity ("don't propose too many destinations at once", "could you stand to the right", "let me do this part of the calculation"), but they also have to maintain what we term a collaborative working relationship [CWR] (van de Puil & Andriessen, 2005). If people perceive that their contribution (or their own person) is not appreciated, for example, then they will progressively or abruptly withdraw from the collaboration; conversely, if the interaction moves too much towards the pleasure felt in being together, perhaps the job will not get done. Maintaining collaboration requires maintaining an appropriate CWR. And all this is of course true when students collaborate in problem solving. Our conception of the CWR comes close to what Crook (1994) has termed the "collaborative experience of learning" [our italics].

Pictorial knowledge representations and technology tools for regulating collaborative learning
Piia Naykki, University of Oulu, *Finland*
Sanna Järvelä, University of Oulu, *Finland*

The aim of this study is to explore how pictorial knowledge representations can support collaborative knowledge construction and regulation of collaboration. Prior studies of

collaborative learning have demonstrated that collaboration challenges learners cognitively, motivationally and emotionally during the learning process. Therefore, individuals need to regulate their own learning, as well as, groups' joint learning processes. Cognitive challenges of collaboration are particularly focused on learners' skills to construct knowledge together; make own thinking visible and interpret others' thinking. Studies of knowledge representations have explored how different knowledge representations can support individuals thinking and problem solving activities. However, so far pictorial knowledge representations as a stimulant for structuring and supporting regulation of collaboration by visualising individuals' thinking and collaborative negotiation processes have attained only a little attention. The reported study was a part of teacher students' (N=20) studies of educational technology. In this design experiment, a problem oriented learning task and different cognitive tools, e.g. open source software (weblog and wikispace) as well as computers and mobile phones were used. The data collection period lasted three months, and during that time students' collaborative meaning making processes with pictorial knowledge representations were videotaped and all written data to the technology tools were collected. A stimulated recall interview captured students' immediate reflections of the learning situation. The results of the study indicates that pictorial knowledge representations can enhance collaborative knowledge construction by making thinking more visible, by making group processes more visible and by supporting various modes of interaction, and thus, support regulation of collaboration.

I 22
30 August 2007 14:30 - 16:30
Room: 3.67 Békésy
Symposium

Improving reading

Chair: **Wassilis Kassis,** University of Basel, *Switzerland*
Organiser: **Wassilis Kassis,** University of Basel, *Switzerland*
Discussant: **Gudrun Ziegler,** University of Luxembourg, *Luxembourg*

The five contributors present recent research studies which highlight relevant empirical results in the field of reading competence. The presentations and the discussion will concentrate on important aspects of reading socialization which are fundamental in the educational policy and teaching practice. In the process of reading socialization there is relatively little known about the overall interplay of social and educational family variables and variables of personality, gender and school. Papers draw also conclusions from exploratory studies, bringing together classroom interactional data of different linguistically specific settings (1. u. 2. paper), allowing for a general perspective on conditions and potentials for learning languages within the primary classroom. The 3. paper contributes that there are few investigations, which concentrate on the impact of family background on learning motivation. Presumably, disadvantaged children's motivation is low, but there is no empirical evidence. On the basis of hypotheses, the paper investigates the motives of mastery motives, reading self-concept, math self-concept, desire of positive feedback for learning, and the practical value of learning. The next paper focuses the intervention in school settings for improving reading. Following the results of PISA 2000 and 2003 on reading literacy, which have proved the correlation of low reading abilities and social background, the study is focusing the effectivenes of teaching methods for children and adolescents of different social groups. The

theoretical background consists of a comprehensive model for reading competence, which, in addition to the cognitive dimension, includes emotional and motivational components. At last the 5. presentation is a cross-national, comparative project "Heterogeneity and literacy in pre-school and primary education in a European comparison" (HeLiE). The project focuses on the last few months before school entry and the first few months in school and involves four European countries: Germany, Finnland, Luxemburg and Switzerland.

Reading socialization: A complex process between school, family and peers
Wassilis Kassis, University of Basel, *Switzerland*

In the process of reading socialization there is relatively little known about the overall interplay of social and educational family variables and variables of personality, gender and school (Bertschi-Kaufmann, A & Kassis, W. & Sieber, P. 2004). The study at hand contributes to filling this research gap. This paper presents a longitudinal research project concerning the reading socialization of adolescents in secondary schools in Switzerland. The study is based on the hypothesis that reading socialization processes are complex and not only situated in the school. This longitudinal study was aimed to answer the following questions: Which are the relevant differences in the family reading socialization between high and low language achievers? How do different types of reading socialization in the school influence language performance? Which is the impact of socio-demographic factors (socioeconomic status) on language performance and is this impact the same for girls and boys? The first data collection was in January 2006 and the second is going to be in January 2007. In total the sample includes 1530 adolescents (t1 15 years old/ t2 16 years old). A questionnaire study was conducted with adolescents in their 8. and 9. schoolyear. The study used strucural equations models to investigate how school factors and factors of other domains contribute – by way of the self concept – to reading socialization. Our results indicate quite clearly that combined (within- and extra-school) models should be used in explaining the effects on reading competence. Another finding is that models for males and females have to be treated separately. The results also show a high impact of socioeconomic status of the family of adolescents with multilingual on language performance.

Disenchanting plurilingualisms of promise: Two cases of early classroom talk revealing potentials for learning languages at primary school
Gudrun Ziegler, University of Luxembourg, *Luxembourg*
Charles Max University of Luxembourg, *Luxembourg*

The present paper draws conclusions from a unique exploratory study, bringing together classroom interactional data of two linguistically specific settings (1. Plurilingual Luxembourg & 2. French-German border region of "Saarland"), allowing for a general perspective on conditions and potentials for learning language-s within the primary classroom. Both cases of learners' appropriation of a task through and on behalf of discourse-in-interaction, analyzed from a discourse-interactionnal account (Mori 2004, Palotti 2004, Ziegler/Franceschini 2006) show that the parallel but not analogical problems of early language-s education ("brought-along"-plurilinguals vs. "wanna-be"-plurilinguals) in general are linked with the specific nature of language-s acquisition on early plurilingual grounds as potentials for learning within discourse-in-interaction. The complementary analysis of two very specific cases of early language education in multicultural environments allows - on a larger scale - for detailed insights in a) learners' practices of exploiting and building their repertoires, b) the use generally (un-)made of such learner-specific practices in discourse-in-interaction within educational settings, and c) the emerging and (un-)

developing methods of organizing discourse-in-interaction within the learner (e.g., construction of discourse objects).

The characteristics of learning motivation among disadvantaged students
József Balázs Fejes, University of Szeged, *Hungary*

The relationship between family background and school success is well documented in the research literature. It is known that disadvantaged children's skills, abilities and learning outcomes are poorer than those of their peers from general or advantaged environment (e. g. Cool and Keith, 1991; Csapô, 2003), but the causes of these differences are not totally clear. Although theories about the motivation deficit of the low social class school population have long been presented (e. g. Lawton, 1968), the number of studies focusing on the connections between motivation and disadvantaged status is relatively low (Howse, Lange, Farran and Boyles, 2003). In the literature, there is no definite explanation for the motivation deficit of at-risk children, partly because of the lack of a coherent theoretical foundation (see Murphy and Alexander, 2000). Empirical investigations revealed connections between some motives (e. g. attributions for success and failure in mathematics, intrinsic motives) and socioeconomic status (Gottfried, Flaming and Gottfried, 1998; Mooney and Thronton, 1999), but no connection was found others (e. g. perceived competence, attitudes toward school, worry about school) (Howse, Lange, Farran and Boyles, 2003; Stipek and Ryan, 1997). There are few investigations in Hungary, which concentrate on the impact of family background on learning motivation. Presumably, disadvantaged children's motivation is low, but there is no empirical evidence. On the basis of hypotheses, formulated in the Hungarian literature, the present study investigates the following motives: mastery motives, reading self-concept, math self-concept, desire of positive feedback for learning, and the practical value of learning. Although the questionnaire used covers only a fraction of possible learning motives, its complexity makes it an appropriate instrument for mapping the differences between the individual students.

Improving reading differentially: Teaching methods, socioeconomic status, gender and age
Andrea Bertschi-Kaufmann, Padagogische Hochschule der Fachhochschule Nordwes, *Switzerland*

Following the results of PISA 2000 and 2003 on reading literacy, which have proved the correlation of low reading abilities and social background, our study is focussing the effectiveness of teaching methods for children and adolescents of different social groups. The theoretical background consists of a comprehensive model for reading competence, which, in addition to the cognitive dimension, includes emotional and motivational components. Two main approaches to teaching have been developed, put into practice and evaluated: (1) Open methods aiming at individualized reading in classrooms. These include free choices of texts and free reading time during regular reading lessons as well as various methods designed to bridge the distance between reading material and individual readers. (2) Training methods for reading strategies and skills aimed at different levels in the hierarchy of cognitive processing. In an intervention study the effects of the two different teaching programmes mentioned above are examined. Using a quasi-experimental intervention design, the two teaching methods are compared for primary school pupils in grades 3 and 4 (39 classes, 667 pupils) and for secondary school pupils in grades 7 and 8 (19 classes, 219 pupils). The project involves two experimental groups (interventions with open methods vs. skill-based training) and one control group (no interventions, conventional methods). Over a period of 3 school years, data are collected at four points in time. Findings on the relationships between the teaching approaches, students' literacy practices, motivation and self-

perceived as well as objectively measured competences in reading were presented at the EARLI conference in 2005. In addition in our present paper longitudinal results of the latest point of measurement will be reported and the categories Socioeconomic Status, migration status, gender and age will be focussed. In our conclusion we are going to draw conclusions concerning what we refer to as differential didactics.

J 1
30 August 2007 17:00 - 18:20
Room: -1.63
Paper Session

Assessment of competence

Chair: **Patrik Scheinin,** University of Helsinki, *Finland*

Measuring measuring: An item response theory approach
Brent Duckor, University of California, Berkeley, *USA*

The purpose of this study is to examine individual understanding of a particular evidence-based framework for constructing measures (NRC, 2001). Given the broad range of misconceptions that still persist, experts have lamented the challenges for the field of measurement and assessment (Braun & Mislevy, 2005; Popham, 2000, 2004). Building on the model of expert-novice studies in how individuals think and learn in other domains, the study explores the "building blocks" associated with proficiency in a new evidence-based approach to measurement, the Constructing Measures (Wilson, 2005) framework. The study employs mixed quantitative and qualitative methods to generate and evaluate an instrument designed to measure CM proficiency. The instrument is based on a content analysis of the CM framework, and resulted in six dimensions of proficiency. The open-ended and fixed response format test instrument was utilized to collect responses from 72 participants. Guided by the 1999 Standards for Educational and Psychological Testing, analysis of validity evidence, consisting of evidence related to content, response processes, internal structure, and relations to other variables, suggested that the instrument can detect meaningful differences in proficiencies on several dimensions. The partial credit Rasch item response model employed fit the data acceptably well. Internal consistency indicators, such as person separation (.87) and Cronbach's alpha (.89), provided evidence for the instrument's reliability. Results from further reliability analysis indicated high inter-rater agreement (.98) for scoring of the non-objective items. The relationship between individual CM proficiency and other background variables was tested with multiple linear regression analysis. The results indicated that both research and consulting experience have a statistically significant (p

How to assess text, table and graph understanding? Strengths and shortcomings of teachers' Ideas on this point.
Jesus Alonso-Tapia, University Autonoma of Madrid, *Spain*
Fermin Asensio, Institute of Secondary Education "Maria Zambrano", *Spain*
Fermin Asensio, Institute of Secondary Education "Maria Zambrano", *Spain*
Inmaculada Lopez, Institute of Secondary Education "Joaquin Araujo", *Spain*
Nuria Carriedo, Universidad Nacional de Educacion a Distancia, *Spain*
Fabio Rychecki, Universidade de Caxias do Sul, *Brazil*

The present work was carried out as part of a series aimed at identifying teachers' ideas on assessment. The two studies presented examine teachers' ideas about how text, table and graph understanding should be assessed to help students' learning. First, the psychological models from which teachers' ideas should be evaluated were established after a careful review of literature on the nature of each competence to be evaluated. Second, 68 secondary school teachers -38 from Spain and 30 from Brazil- were asked to design assessment situations adequate for the mentioned purpose. Results showed convergence of data coming from both countries, enlightened specific

strengths and shortcomings of teachers' ideas on assessment and are useful for designing teachers' training programs on students' assessment.

Effects of item headings in aptitude tests: evidence that math-related labels impair students' performance in deductive reasoning tasks
Carlo Tomasetto, University of Bologna, *Italy*

Two studies examine the effects of domain-related labels used as item headings in aptitude tests. It appears that items and exercises aimed at assessing domain-general cognitive abilities (e.g., hypothesis testing in deductive reasoning) are alternatively labelled under the headings of "math", "sciences", "verbal logic", "reasoning" items, and so on. Past research points out that task labelling may heavily affect solvers' performances, depending on shared beliefs about intrinsic difficulty of the domain evoked by task label. We hypothesized therefore that when deductive reasoning tasks – administered with the purpose of testing aptitudes - are labelled as diagnostic of math-related abilities, students' performances may be thwarted, compared to conditions in which the same tasks are labelled as diagnostic of verbal reasoning skills. In study 1, a modified version of the Wason Selection Task was labelled as diagnostic of "formal math demonstration" vs. "verbal reasoning" skills, by means of a heading on the top of the page. Results confirm that the rate of incorrect (confirmatory) answers is significantly higher under math rather than verbal/logic heading, independently from students' perceived past success in math. In study 2, the Selection Task was inserted in a battery including other six items, three equations labelled as "math" items, and three text comprehension items (labelled as "verbal reasoning"). We hypothesized and found that when math items are indicated as the most diagnostic of students' aptitudes, the rate of incorrect (confirmatory) answers at the Selection Task is significantly higher when this task is placed under the "math" rather than to the "verbal reasoning" heading, whereas no difference due to the Selection Task heading appears neither when diagnosticity is attributed to verbal reasoning items, nor in the control condition. Theoretical and applied implications of the two studies will be discussed.

National examinations and school evaluation in secondary schools - Study of the relation between pedagogic practices and students results in Biology of socially differentiated schools
Ana Saldanha, University of Lisbon, *Portugal*
Isabel Neves, University of Lisbon, *Portugal*

The study is focused on biology education and addresses the following problem: What is the extent to which teachers' pedagogic practices are conditioned by the level of conceptual demand required by national examinations in secondary school Biology and condition the examinations results of students of socially differentiated schools? The study is focused on the following objectives: (1) compare the level of conceptual demand of teachers' practices with the level of conceptual demand of syllabuses and of examinations; (2) compare the examination marks obtained by students of socially differentiated schools and receiving pedagogic practices with distinct levels of conceptual demand. Theoretically the study is based on Bernstein's model of pedagogic discourse and on Vygotsky's social constructivism and methodologically uses an interpretative model of text analysis. The sample was made up of four schools and respective teachers and students of secondary school Biology. The schools differed in their social composition and showed to be different in their results in the Biology national examinations. The results show that it is the typology of examinations that fundamentally dictates the rules that direct the recontextualizing of syllabuses evident on the teachers' pedagogic practices. They also show that pedagogic practices with distinct levels of conceptual demand influence the results in

examinations of socially differentiated students, and as such they may alter the pattern of relation between social class and success.

J 2
30 August 2007 17:00 - 18:20
Room: -1.62
Paper Session

Assessment methods

Chair: **Kari Smith,** University of Bergen, *Norway*

Response shift bias in mechanical training
Tanja Schmied, Swiss Federal Institute for Vocational... (SFIVET), *Switzerland*
Lars Balzer, Swiss Federal Institute for Vocational... (SFIVET), *Switzerland*

There is far less research in the field of vocational educational training (VET) than in general school education. Moreover, existing VET research is mostly focussing on the schooling part, not on the practical training part in the enterprise. In a longitudinal study we are interested in different training practices of mechanical training at the workplace (project QuWibB, http://www.quwibb.info). This paper focuses on a methodological problem, the response shift bias. Generally speaking, response shift bias means that because people develop a different judgement background from one measurement wave to the next one (because new knowledge is built during the training-time), they judge their skills in the training-area at the beginning and at the end in a very similar way, though objectively an improvement could be measured. Therefore, this paper asks the following question: . Does a response shift bias occur? If yes, in which way and with which consequences for the use of data? Among others, we used a questionnaire to ask for the currently experienced job characteristics at both measurement waves. In view of our research goal, we also asked retrospective questions. This is a method to control the response shift bias. Results show that there is evidence for a response shift bias. Trainees don`t judge job characteristics in the same way for current and retrospective view. But the differences are not systematic. For some groups of trainees (first and second year trainees) there is an overestimation (higher values in the current measurement than in the retrospective one), for other groups (third year) it is the other way round. There are also interesting correlation findings. Especially in the domain of competencies we find significantly higher correlations with retrospective than with current motivating potential. Results and significance for the field will be discussed.

Empirical investigation of the Multiple Intelligences Profiling Questionnaire's Environmental Sensitivity Scale
Kirsi Tirri, University of Helsinki, *Finland*
Petri Nokelainen, University of Helsinki, *Finland*

In this study, we extend the Multiple Intelligence Profile Questionnaire (MIPQ, Tirri and Komulainen, 2002) based on Gardner's (1983, 1991, 1999) MI theory with Environmental Intelligence (EnI) dimension that is based on the Environmental Sensitivity Scale (EnSS). The operationalisation of both scales was tested with an empirical sample of Finnish preadolescents, adolescents and adults (N=496). First, we studied if nine EnSS items reflect the three categories of

environmental sensitivity: (1) Love for nature, (2) Nature conservation and (3) Environment-friendly consumer habits. Second, we reduced the number of items from nine to three to create the EnI component for the MIPQ. Results of the reliability analysis showed that the 9-item solution was the most adequate to operationalize the EnSS. Both MIPQ and EnI had good reliability coefficients in all three sub samples. Bayesian Dependency Modeling confirmed that the EnSS consisted of suggested three dimensions in all three sub samples. The results of confirmatory factor analysis showed that both scales fitted all three sub samples well.

Concepts and methods to diagnose and develop Bloom's taxonomy mental processes
Dieudonne Leclercq, University of Liege, *Belgium*

For large groups of students (300 to 600) it is not easy to implement examinations that conciliate qualities such as objectivity of correction, , practicability, rapidity, predictivity, reliability and, above all, theoretical construct validity in terms of mental processes. For each of the six levels of Bloom et al.'s (1956) taxonomy of the cognitive processes, we have refined the concepts, on the basis of cognitivists' and epistemologists' works (Reder, 1987 ; Bredart & Modollo, 1998 ; Park & Reder, 2004 ; Perry, 1970) . For instance, at Knowledge level, we have designed a new instrument called "Large MCQ", mid-term way between recall and recognition. At comprehension level, we have developed Smedslund's (1997) definition of comprehension, designing "interchanges in translations". At the application and analysis levels, we stress the distinction between questions and problems, suggested definitions to classify questions and propose the concept of cognitive vigilance. At the synthesis level, we propose a multicriterial self evaluation procedure in open ended answers and essays. At the evaluation level, we propose the use of Degrees of Confidence (De FInetti, 1965) and the representation of quality of answers as a spectral distribution of quality (Leclercq, 2003). Given those concepts and instruments, we made steps towards assessment results that can be diagnostic and distinctive (Engelhart, 1994) in terms of Bloom's taxonomy. We use a combination of new forms of MCQs, of Open Ended Questions and of Degrees of Certainty in the same testing session. Students have been trained by simulated exams and the effect of this has been measured through the evolution of 80 students in 3 parallel tests taken in 3 month time. Results are analysed instrument by instrument.

Children's school readiness: predicting school competence before first grade
Loredana Mihalca, Department of Psychology, Babes-Bolyai University, *Romania*
Yiannis Laouris, Cyprus Neuroscience & Technology Institute, *Cyprus*
Mircea Miclea, Department of Psychology, Babes-Bolyai University, *Romania*

The assessment of school readiness is a priority aspect of early childhood education. Because the construct of school readiness is multifaceted, we decided to examine children's patterns using multiple indicators previously found to be both theoretically and empirically linked to school readiness. These include physical health, social/emotional development, approach learning, language development, cognitive and general knowledge. By focusing on patterns of functioning across diverse domains of children's development shown to predict future performance in school, our experimental study aims to develop a comprehensive methodology towards the examination of the construct of school readiness.In addition, we also examine whether these multidimensional patterns can predict achievement functioning in the first grade of schooling. In discussions about cognition and learning in early childhood (Blair, 2002), memory and attention are considered crucial for the conceptualization of executive function. We have therefore decided to evaluate such abilities using a validated computer-based instrument known as MAPS (Mental Attributes Profiling System). Specifically, we have used MAPS' auditory and visual memory tests, and

visual- auditory discrimination tests. The social abilities of children (social skills and externalizing behavior) were measured with versions of the Social Skill Rating System (Gresham & Elliott, 1990) and Child Behavior Checklist (Achenbach, 1991) validated for our populations. Finally, the emotional skills of the subjects were evaluated with a test developed on basis of the Test of Emotion Comprehension (TEC, Pons & Harris, 2000) and the Ontario Child Health Study. Parallel experiments are currently been performed in Romania and in Cyprus, within a nationally representative sample of kindergartners. Preliminary results of this extensive study will be presented at the EARLI conference.

J 3
30 August 2007 17:00 - 18:20
Room: 7.14
Paper Session

Comparative evaluation

Chair: **Alex Kozulin,** Int'l Center Enhancement of Learning Potential, *Israel*

Social segregation in secondary schools
Stephen P. Jenkins, Institute for Social and Economic Research Univers, *United Kingdom*
John Micklewright, University of Southampton, *United Kingdom*
Sylke V. Schnepf, University of Southampton, *United Kingdom*

New evidence is provided about the degree of social segregation in 27 OECD countries using the 2000 and 2003 rounds of the Programme of International Student Assessment (PISA). Sampling variation is allowed for and various measures of social background are applied in order to test robustness of results. England and the USA are shown to be middle-ranking countries. Several countries with separate school tracks for academic and vocation schooling - Austria, Germany and Hungary - have relatively high social segregation and over half of this is accounted for by unevenness in social background between school tracks. Low segregation countries include the four Nordic countries. The decomposition of segregation indices shows that in general unevenness in pupils' social background between private and public schools has only a marginal impact on countries' level of segregation. Cross-country differences in segregation are associated with the prevalence of ability selection of pupils by schools.

Why do non-cognitive variables predict more mathematics performance in some countries than in others? A methodological study of PISA 2003
Dominique Marie Lafontaine, University of Liege, *Belgium*
Christian Monseur, University of Liege, *Belgium*

In 2003, mathematics performance of 15 year-olds has been measured in OECD countries by PISA. Besides cognitive achievement, several non-cognitive concepts have been measured: self-concept, instrumental motivation, self-efficacy and anxiety towards mathematics. Accordingly with the literature, those non-cognitive indices are moderately related to mathematics performance. But the percentages of variance explained by those indices at the student level strikingly vary across countries. At first glance, it seems that the percentage of variance explained by the non-cognitive aspects is the highest in the most comprehensive education systems (the Nordic

European countries) and the lowest in the most-segregated systems (using tracks, grade repetition like Austria, Belgium, Germany, …). So the strength of the relationships seems to be related to the structure of the education system. A hypothesis for this phenomenon is that the non-cognitive variables are based on self-reports and that students, when answering those questions, use a group of reference (their classmates or schoolmates). In order to test this hypothesis, the mathematics score and the non-cognitive variables have been standardized by school, by school and by grade, and by school, by grade and by track. The results of those analyses clearly show that this standardization change few if anything in the comprehensive systems in which all 15 year-olds attend the same grade, in which there is no track and the between-school variance is low. On the contrary, in segregated systems, in which 15 year-olds are spread in different grades and tracks, this standardisation strongly impact on the strength of the correlation between cognitive and non-cognitive aspects. The data support the hypothesis of the use of a group reference and provide an interpretation for this counter-intuitive finding that in some countries non-cognitive concepts much more predict cognitive performance than in others.

Educational inequality between the East and the West: comparing the developed countries/region in Eastern Asia and Western Europe on their fifteen-year-olds' educational achievements and career expectations

Ling Li, European University Institute, *Italy*
Jean Pierre Verhaeghe, Department of Education, Ghent University, *Belgium*

This study undertakes an evidence-based approach to compare the differences between Eastern Asia and Western Europe on their 15-year-old adolescents' educational achievements and future career expectations, and how these differences are related to the educational practices in different countries. PISA (Programme of International Students Assessments, OECD) 2003 study database related to eight countries/region in Eastern Asian and Western Europe are explored, with Japan, Korea, Hong Kong-China on one side and UK, Belgium, the Netherlands, Germany and France on the other. Three-level hierarchical models with students nested in schools and schools in countries are used to model the outcomes. After having controlled for the impact of family background and students' individual characteristics, analyses focused on the impact of general educational policies and specific school practices on students' outcomes. Multilevel models with random intercepts/slopes model as well as cross-level interaction between schools and individuals are applied so as to capture the complex reality in schools. The findings help to understand educational effectiveness across different cultures.

The power of two: Linking informatics with pedagogy in curriculum mapping

Mary Jane Mahony, University of Sydney, *Australia*
Melinda J. Lewis, University of Sydney, *Australia*

Curriculum planning and review is enhanced when descriptive data normally presented in text or numbers is visually displayed. Semi-automated strategies informed by informatics were applied to produce maps of curricular elements over time and across both individual subjects and whole health sciences undergraduate courses in a large, research-intensive university. Exploratory work used both retrospective institutional data and university teachers' reflective expectations on assessment type, timing and preparation time. University teacher and program manager satisfaction with this approach led to current work applying the same strategies prospectively in new course curriculum planning and extending beyond assessment to include mapping graduate attributes and learning outcomes.

J 4
30 August 2007 17:00 - 18:20
Room: 0.87 Marx
Paper Session

Conceptual change

Chair: **Mary Dawn Ainley,** University of Melbourne, *Australia*

What happens when they meet: pre service teachers' discourse about a course assignment
Dita Fischl, Kaye College, *Israel*

Abstract The study examines two continuous discourse events during a semester course in a teacher education college. The discourse is about the course assignment, a weekly tutoring of a mentally challenged person by a pre-service teacher. The study aims to characterize the professional development of the course participants, by analyzing their discourse, implementing Kagan's (1992) professional development model. Primary findings, sampled from previous year discourse, indicate at the beginning of the assignment concerns and personal difficulties, followed by knowledge acquisition, without use of external knowledge, such as recommended readings. These findings are primary and may hint to a process partly compatible to Kagan's model that claims, experience contributes to knowledge acquisition and changes pre-service teachers' previous beliefs.

Materialistic Thinking of Sound – A Quantitative Study
Haim Eshach, Ben Gurion University of the Negev, *Israel*

The present research is a continuation of the qualitative research of Eshach and Schwartz (2006). The present research aims at sharpening and broadening their results by examining a large population of students, allowing thereby a precise quantitative treatment of the subject. In this way, we are in a better position to gauge how prevalent and consistent materialistic thinking is among students. The Research is based on a true/false questionnaire, composed of 36 questions, each describing a situation or a phenomenon related to sound. The questionnaire was filled by a total of 396 participants. The total average of correct answers throughout the different groups of participants was 59%. Although teachers' percentage of correct answers was statistically significantly higher than the students, still, in average, only 73% of the questionnaire was filled out correctly by them. Many participants of this study also possessed the concept that sound changes its style of motion in different mediums, and that sound is a continuous phenomenon (e.g. spreading in a kind of an infinite form). This provides support to the conclusions of Eshach and Schwartz (2006) in several ways: First, it is clear that students and moreover, even teacher-students attribute materialistic characteristics to sound. However, sound is not perceived as a "regular" matter that entirely fit Reiner's et al. categories, but rather as an entity that can change mechanism of propagation when travelling through different mediums and travels in kind of an infinite form. In addition, it seems like the participants' answers were not globally coherent, but rather local coherency was searched by the students in their answers. This article, which enriches our understanding of students' concepts of sound, especially in people's materialistic thinking, may help physics teachers to channel students from their materialistic thinking to the accepted scientific understanding of sound.

Students' understanding about the dense structure of rational numbers
Xanthi (Xenia) Vamvakoussi, University of Athens, *Greece*
Stella Vosniadou, University of Athens, *Greece*

In this paper we present preliminary results of an empirical study that investigated students' understanding of the dense structure of the rational numbers set, from a conceptual change perspective. According to the conceptual change approach, students' initial explanatory frameworks for number are tied around natural numbers and it is predicted that learning about properties of rational numbers that are different than those of natural numbers will be difficult and accompanied by misconceptions. One such property is density: While natural numbers are discrete (between two successive natural numbers there is no other natural number), the rational numbers are dense (i.e. between any two non equal rational numbers there are infinitely many rational numbers). We hypothesized that students' responses to tasks related to density would be constrained a) by the idea of discreteness, and b) by the kind of numbers defining the given intervals (e.g. natural numbers, decimals, fractions). The participants of the study were 181 7th graders, 166 9th graders, 202 11th graders and 197 upper secondary school graduates. We administered forced choice questionnaires, consisting of 14 items. The results of the study showed that the idea of discreteness remained strong up to the last grades of the upper secondary school and also for graduates. We also found that students gave more sophisticated answers in the case of natural numbers than in all other cases, and that they showed a strong tendency to answer that there are fractions between fractions and decimals between decimals. In addition, some students attributed the property of discreteness to fractions, but not to decimals, or vice versa. These results support our hypotheses.

Constructing conceptual development scales by using IRT models
Erzsébet Korom, University of Szeged, *Hungary*
Gyöngyvér Molnár, University of Szeged, *Hungary*

This paper presents a study aiming to assess the development of students' conceptual change in the field of structure of matter. To put the results into developmental context and to break the correspondence between category labels and score levels, the models of Item Response Theory (IRT) were used, which permit items to have any number of categories assigned to the same score level, while the categories are still modeled separately. The aim of the study was to define the ability level necessary to abandon the different types of conceptual understanding of simple physical phenomena (naïve beliefs or partially correct, but qualitatively different misconceptions) and to reach the level of scientific understanding. Samples were drawn form the 8th, 10th and 12th grades, with ca. 240 students in each cohort. A pencil and paper test was used. The first part of the test contained 18 items about the features of different states of matter in multiple-choice format. The remaining 35 items used free-response format for students to express their understanding of the particle model and to apply their knowledge to explain physical phenomena. Two procedures were used to quantify the results: (1) responses were scored 0 for not acceptable and 1 for acceptable; (2) in the second part of the test, 4- to 6-point scales were also used. The results show that students with average ability levels have a high probability (78%) of solving items on the features of the structure of matter in a school-like disciplinary manner. The item difficulty levels of items that require knowledge application are in the middle or the upper third of the ability scale. Item thresholds indicate the ability level for each of the categories. These change by items with different content and by items with the same content but different task type.

J 5
30 August 2007 17:00 - 18:20
Room: -1.64
Paper Session

Development of expertise in specific domains

Chair: **Szilvia Jámbori,** University of Szeged, *Hungary*

Productive writing and multivoiced feedback in the study of law Enculturation and legal problem solving in a Virtual Learning Environment
Arne Vines, University of Bergen, *Norway*

This paper explores the pedagogical affordances of using a Virtual Learning Environment (VLE) in the study of Law. Through a close investigation of undergraduate law students' written interaction in a VLE, this case study shows that this technology affords a framework for a more complex interaction between a large numbers of students and more knowledgeable teacher assistants at an innovative Norwegian Law faculty. A clear finding is the productive aspect of conflict, resistance, arguing and meaning exchange between different voices in the written interactions. However, the study also indicates and discusses indications of unproductive and even counterproductive peer feedback. Viewed in the light of the Bakhtinian dialogic theory of learning, and also with the aim of preparing law students for a future working practice, it is claimed that they need to learn how to produce knowledge, not just reproduce set opinions from authorities such as textbook authors, professors, and legislators. From this research it is shown that systematic writing and thorough feedback from peers and a more knowledgeable teacher assistant, mediated by a thought-through use of a VLE, represents a prolific way of learning and appropriating the core practices and methods of the law discipline. But the findings from this case study is, however, ambiguous towards the role of the VLE, and one of the main conclusions is that educators and learning designers should take serious cautions to the subtle boundary between socialising students into an academic community and its discourse, and, on the other hand, to foster their ability to create and make use of their own 'voice' in subject matters.

A self-regulatory action research model for learning to teach using the WebQuest as a mediator
Maria Cardelle-Elawar, Arizona State University-West Campus, *USA*
Maria Luisa Sanz de Acedo Lizarraga , Universidad Publica de Navarra, *Spain*

This paper reports on the use and instructional benefit of a WebQuest on the Theory of Multiple Intelligences in a graduate-level course on Learning and Instruction. The WebQuest provides an interactive learning experience for students to explore the theory of multiple intelligences and enhance their learning by guiding them through a self-reflection of their teaching skills. Student feedback regarding the WebQuest as a mediating tool indicated that it served as a frame of reference to learn about themselves and their students' diversity. Ultimately, students gain new insights into student performance, behavior and success by using learning and multiple intelligence theories to tap the individual needs of their students. Through the WebQuest, the authors emphasize the importance of the role of the teacher as a mediator in facilitating the learning process. We conclude with a discussion of future directions we are taking with the WebQuest as a result of this study.

Expertise development in law: Acquisition of conceptual knowledge structures
Fleurie Nievelstein, Open University of the Netherlands, *Netherlands*
Tamara van Gog, Open University of the Netherlands, *Netherlands*
Henny Boshuizen, Open University of the Netherlands, *Netherlands*
Frans Prins, Utrecht University, *Netherlands*

This study investigated expertise-related differences in conceptual knowledge structures in law. Insight into the development of professional expertise can contribute to the improvement of education in this profession. Participants were 24 novices (first-year students), 24 advanced students (third-year students), and 12 members of law faculties from Dutch Universities with on average 5.9 years of experience (experts). They had to perform two tasks. First, a card-sorting task that allowed us to study the organization of conceptual knowledge. Second, a concept-explanation task that allowed us to study the depth of knowledge and spontaneously reported conceptual associations. Participants were instructed to think aloud while performing the tasks. Hierarchical cluster analysis of the card-sorting task shows marked differences between the three levels of expertise. Novices' knowledge structures had hardly any resemblance in conceptual organisation, advanced students revealed strong shared conceptual knowledge about the tenet 'tort', while experts knowledge was characterised by a strong shared conceptual knowledge and hierarchical clustering according to area's of law for experts. Results from the concept-explanation task show that novices in the field use significantly more daily language in the form of daily examples with lack of legal content than advanced students and experts. Furthermore it was found that as expertise develops accuracy of concept explanations increases. We can conclude that a conceptual transformation is taking place from nañve and unconnected knowledge to formal and hierarchically structured knowledge. Given the importance of conceptual knowledge for the ability to solve cases, future research in learning and instruction should investigate how to facilitate this conceptual transformation.

Identification of strategies to increase enrolments in engineering
Sid Bourke, The University of Newcastle, *Australia*
Elena Prieto, The University of Newcastle, *Australia*
Allyson Holbrook, The University of Newcastle, *Australia*

In Australia, as in many other industrialised countries, there is considerable evidence to show that in spite of strong career prospects, there has been a decline in the study of engineering degrees in universities (Langen & Dekkers, 2005). This work reveals that the percentage of engineering graduates in Australia is in the lowest quartile for OECD comparison countries. This decline could potentially compromise Australian and many European countries' ability to be at the forefront of global scientific and technologic development. The reasons for the falling number of enrolments in engineering tertiary studies have been assessed from different perspectives, as detailed in a number of government reports over the past few years (Prieto, Holbrook & Bourke, 2006). These perspectives include: national investment; sources of information; education; and perceptions of engineering. More specifically, according to Prieto, Holbrook and Bourke the factors affecting enrolments in engineering are the following: 1. National Investment (both government and private) 2. Sources of Information (parents, teachers, careers advisors, media and industry) 3. Education a. Quality, expertise and motivation of teachers b. Curriculum (leading to trajectory and education opportunities) c. Effectiveness of outreach programs focusing on engineering 4. Perceptions of engineering (what engineers do, financial rewards, and personal characteristics of engineers). This paper describes the development of an instrument created in Australia to measure the main reasons for the decline in engineering enrolments in tertiary studies and the ways in which the research

team will analyse the different dimensions arising from the instrument. The instrument was administered in 2006 and preliminary results will be available early in 2007 for the full version of this paper. The survey includes over 250 schools across Australia at both primary and secondary levels in rural, regional and urban areas.

J 6
30 August 2007 17:00 - 18:20
Room: 0.89 Jedlik
Paper Session

Science education

Chair: **Philip Adey,** Kings College London, *United Kingdom*

The nature of guidance and the development of conceptual understanding in inquiry-based science lessons in the US: A study of four middle school teachers
Erin Marie Furtak, Max Planck Institute for Human Development, Berlin, *Germany*

This paper is a mixed-method exploration of the nature of guidance four middle school science teachers provided to their students during scientific inquiry discussions about sinking and floating. Videotapes of discussions were coded according to a framework of guidance in classroom talk and rated as high, low, or mixed. Discussions were also coded according to the conceptual level of the discussion with respect to a learning progression for relative density. These codes and measures of student learning were compared between four teachers: two with students who made higher learning gains through a unit, and two with students who made lower learning gains. Results indicate that the teachers who took a more active role in guiding students toward particular conclusions in discussions had students with higher learning gains, whereas the teachers of students with lower learning gains provided less guidance to their students. The cases presented in this paper highlight the importance of teachers taking an active role in helping students to construct their understanding, even in scientific inquiry settings.

Case study about changing students' perceptions of teacher interpersonal behaviours
Bruce Waldrip, University of Southern Queensland, *Australia*
Jeff Dorman, Australian Catholic University, *Australia*
Darrel Fisher, Curtin University, *Australia*

The paper reports on part of a large-scale study aimed at examining students' perceptions of teacher-student interactions. This paper will report on a case study utilising mixed methodology in 12 Queensland primary classrooms. After the students' perceptions were established, the teachers, through a consultative process, developed strategies to change the students' perceptions of their classroom over a three month period. The paper reports on what strategies these teachers utilised and what changes in students' perceptions resulted. The classroom teachers were interviewed about the change in students' perceptions, what changes they had sought to promote in their classrooms, and what they felt had been achieved in their classrooms. The study found that students were able to articulate what changes the teacher had implemented, what their reaction was to these changes and their perception of the classroom environment as a result of these implemented strategies.

Examining the effects of electronic mentoring prompts on learners' scientific reasoning skills in an online conference
Charoula Angeli, University of Cyprus, *Cyprus*
Nicos Valanides, University of Cyprus, *Cyprus*

The purpose of the study was to develop an instructional framework for promoting learners' scientific reasoning skills in a text-based online conferencing system for science, and then to report on its effectiveness. A review of the literature was conducted which identified three different types of written prompts for promoting reasoning skills in science. They included (a) prompts for promoting conceptual understanding in science, (b) prompts for promoting general thinking skills, and (c) prompts for promoting science-specific processes. Preliminary results of the study showed that the framework of electronic mentoring prompts was beneficial for the development of learners' scientific reasoning skills, provided that the instructor properly and persistently mediated students' discourse in the online conference.

Enhancing students' views on the nature of science and their general thinking dispositions in the context of writing-to-learn science
Tili Wagner, Weizmann Institute of Science; Beit Berl College, *Israel*
Tamar Levin, Tel-Aviv University, *Israel*

The study examines the simultaneous development of students' views on the nature of science (NOS) and their more general thinking dispositions (TD) in the context of writing-to-learn science. The study is a theory-driven study, inspired and informed by the constructivist view of learning, cognitive and social theories of the writing process, theories of critical thinking dispositions and views on NOS. It responds to the need for further exploration of the pedagogical conditions that enhance students' desired views on NOS, and conceptualizes writing as a tool for learning and thinking, capable of generating educational experiences that promote science literacy. Since most interventions reported use mainly scientific genres of writing, and in response to calls to expand the modalities of writing tasks in research, this study has used informal writing task assignments. The research provides hard evidence that the combined use of diversified types of informal writing-to-learn tasks in science and reflection on the writing can enhance both eighth graders' views on the nature of science and their more general thinking dispositions. The study further shows that epistemic views on science are most meaningful in predicting more general thinking dispositions. The study renders an optimistic view of pedagogical opportunities for developing scientific literacy, suggesting an integration of explicit and implicit learning experiences. The study suggests that writing experiences that offer a meaningful context for developing students' epistemological beliefs and thinking dispositions should be provocative, open-ended, stimulating, and creative, express complex questions concerning real world dilemmas, and should be articulated in different genres.

J 7
30 August 2007 17:00 - 18:20
Room: 2.54 Novobátzky
Paper Session

Learning and developmental difficulties

Chair: **Constantinos Constantinou,** University of Cyprus, *Cyprus*

Naming speed and literacy abilities in children with language difficulties
David Messer, Open University, *United Kingdom*
Julie Dockrell, Institute of Education, *United Kingdom*
Nicola Murphy, University of Hertdfordshire, *United Kingdom*

The double deficit model of dyslexia assumes that there are two independent contributions to literacy difficulties: phonological impairments and slower speed of information processing (Wolf & Bowers, 1999). Phonological impairments are believed to result in decoding difficulties, while slower speed of information processing, as assessed by naming speed, is believed to result in difficulties with reading comprehension. Children with Word Finding Difficulties (WFDs) have impaired language involving difficulties with the retrieval of words that they can comprehend, they also are slower at naming than typical children. Consequently, they provide a different, but appropriate, population to evaluate the double deficit model further. The current study was conducted to test the double deficit model and to investigate the literacy abilities of children who have WFDs. Forty-two children with WFDs took part in a longitudinal study over three years. The mean age of the children at the start of the study was 7;2 years. Most children performed within the average range on assessments of phonological awareness and decoding. In contrast, the children's standardised scores on reading comprehension were at the low end of the typical range, and their serial naming speed was severely impaired. This pattern of findings where there is a difference between two sets of abilities related to literacy corresponds to the predictions of the double deficit model. The expected significant correlations between phonological awareness and decoding, and between naming speed and comprehension were identified. However, contrary to expectations, phonological awareness was significantly correlated with reading comprehension and naming speed was significantly correlated with decoding; relations that are not predicted in the double deficit model. The findings are discussed in relation to the double deficit model and alternative interpretations of the results are explored. In addition, the implications of the findings for interventions are outlined.

The risk factors for later reading and math disabilities during the preschool year
Marja-Kristiina Lerkkanen, University of Jyväskylä, *Finland*
Anna-Maija Poikkeus, University of Jyväskylä, *Finland*
Pirjo-Liisa Poikonen, University of Jyväskylä, *Finland*
Helena Rasku-Puttonen, University of Jyväskylä, *Finland*

In this study data of 6-year-old children (n = 139) followed up during their preschool year were analysed to study the extent to which preschool entry skills predict the children's progress in reading and math and to study whether potential risk factors for later learning difficulties can be identified. Measures of vocabulary, conceptual understanding, listening comprehension, memory, rapid naming, phonological awareness, letter knowledge, reading skill and mathematical skills (number sequence skills, addition, number concept skills) were administered in October and April

of the children's preschool year. Children were also interviewed on learner self-concept at both times and rated on motivational strategies. First, it was found that variation among children in skill level was great especially in math development. Secondly, entry-level letter knowledge and phonological awareness correlated strongly with end of year word list reading, whereas number sequence skills and conceptual understanding correlated strongly with later math skills. Third, in identification of risk for learning difficulties a criterion combining the following key skills is recommended: poor mastery of letter knowledge, phonological awareness and number sequence skills. Children whose scores fulfilled the criterion on all these measures at preschool entry formed 8% of the sample. Statistically significant differences emerged in the mean scores of all reading and math outcomes between the groups with and without the risk. Children with risk were rated to show more avoidant strategies than children without risk in the testing situations. In self-concept a trend emerged indicating higher self-concept concerning preschool tasks in children with risk but the difference was not significant. The findings point to the importance of carefully planned screening of risk factors at the beginning of the preschool year in combination with provision of well-focused support as effective prevention of learning difficulties.

Self-efficacy beliefs for reading and writing: effects of grade level and achievement level
Barbara Arfe, University of Verona, *Italy*
Bianca De Bernardi, University of Verona, *Italy*
Francesca Poeta, University of Padua, *Italy*

This study tested the hypothesis that reading and writing self-efficacy beliefs differ in children of different achievement level (average, poor and good readers and writers) but not of different school age (4th , 6th, and 8th graders). One hundred and sixty-five children participated (4th graders, 6th graders, and 8th graders). The students' academic, reading and writing self-efficacy beliefs, and their reading comprehension and writing skills were assessed. Results revealed significant differences between groups related to the students' achievement level, but not to their grade level. No interactions between the two factors (achievement level and grade level) were observed.

Possible pitfalls on the path to fluent reading
Marita Makinen, University of Tampere, Finland, *Finland*

Although the role of phonological awareness in reading has been well reported, its relationship, to the effects of language-specific factors has yet to be examined. One fifth of Finnish children face problems in the process of learning to read despite the extremely regular orthography of Finnish language. With the focus on these psycho-linguistic approaches the longitudinal research follows the development of the reading of children from preschool to the end of basic education. This study examines the children's reading skills at the end of their second grade (ages 8-9) and fourth grade (ages 10-11). Also, there is a retrospective look at the principles of the early intervention that strengthened phonological skills. There were certain inclusive methods for training phonological awareness in preschool education. Data consisted of oral reading assessments and retrospective data of the assessments of phonological skills. There were also reflection diaries of teachers. An approach combining the quantitative and qualitative samples was used. The results suggested that the reading style adopted by a child in early stages of learning to read predicts the characteristics of later reading style. The findings support the observations that the problems in reading fluency reflect cross-linguistic phonologically based difficulties. They may result from problems in perceiving the language-related supra-segmental features of a word. The results reflected that the signs of struggling reading were evident already before reading instruction. The

early training supported the development of reading skills. The best support was given by exercises that emphasized the skills of analyzing the rhythmic structure of words. The study reinforced the notion that it is important to pay attention to the development of reading skills both consistently and from a wide range of perspectives all through the comprehensive school.

J 8
30 August 2007 17:00 - 18:20
Room: 4.95
Paper Session

Cognitive skills

Chair: **Peter Reimann,** Northumbria University, *Australia*

Improving students' working memory, fluid intelligence, and science achievement through computerized cognitive training
Kun Yuan, Stanford University, *USA*
Richard Shavelson, Stanford University, *USA*
Alicia Alonzo, the University of Iowa, *USA*
Jeffrey Steedle, Stanford University, *USA*

Working memory (WM) is a cognitive system responsible for simultaneously maintaining and manipulating information during cognitive activity (Baddeley & Hitch, 1974). It contains both attention control and memory storage capacities (Engle, Tuholski, Laughlin, & Conway, 1999). It has been found to be closely related to fluid intelligence and science achievement (Yuan, Steedle, Shavelson, Alonzo, & Oppezzo, in press). Historically, working memory capacity (WMC) was assumed to be fixed. A recent study found computerized cognitive training (CCT) could significantly increase WMC and fluid intelligence of children with attention-deficit/hyperactivity disorder (ADHD) in a clinical setting. This study examined whether regular students would significantly improve their WM, fluid intelligence, and science achievement, through CCT in a school setting. Thirty-seven seventh and eighth grade middle-school students participated in a pretest-posttest controlled experiment to examine whether CCT would significantly improve their WM. Students were randomly assigned to either experimental or control groups after they took measures of WM, fluid intelligence, and science achievement. Experimental group students took CCT on WM, while control group students studied computerized science lessons and low level CCT on WM. Students in both groups were trained for 24.65 days on average. Students were retested with the same tests at end of training. Analyses of covariance (ANCOVA) examined whether experimental group students made significantly greater improvements on WM, fluid intelligence, and science achievement than did control group students. Results confirmed that students improved their memory storage and attention control, with more improvement in the former than the latter. A tentative connection between CCT tasks and performance on WM measures was observed. No substantial changes were observed in fluid intelligence or science achievement. We recommend adding dual-type training exercises to further enhance CCT's impact on WM, fluid intelligence, and science achievement.

Picturing colligatory concepts in history: effects of student-generated versus presented drawings
Carla Van Boxtel, University of Amsterdam, *Netherlands*

In the domain of history, colligatory concepts (e.g. Renaissance, Industrial Revolution) are difficult to learn. Pictures may have a potential to enhance learning of such abstract concepts. In this study we investigated the effects of student-generated versus presented drawings on the understanding of the colligatory concept Fall of the West Roman Empire. We also were interested in the question whether the effects differed for students with high and students with low prior knowledge. Participants of the study were 105 students from four secondary school classes. Half of the students had a reasonably amount of prior knowledge on the topic and half of them low prior knowledge. Within each class students were randomly assigned to one of two conditions: Presented drawings or Student-generated drawings. We administered a pre-test and a post-test. The results support the idea that student-generated drawing can be a powerful strategy to learn colligatory history concepts. Students in the drawing condition scored higher on the post-test than students in the condition with presented drawings. Furthermore, it seems that prior knowledge does affect the learning outcomes. We found an interaction effect between Task and Prior knowledge. Drawing appeared to be more effective for students with little prior knowledge, than for students with a reasonable amount of prior knowledge. We did not find significant differences for the quality of the student-generated drawings between high and low prior knowledge students. Both groups were able to draw the colligatory concept Fall of the West Roman Empire.

What makes a difference for beginning readers? Results from a logitudinal study
Edit Katalin Molnár, University of Szeged, Department of Education, *Hungary*
Krisztián Józsa, University of Szeged, CRLI, *Hungary*
Éva Molnár, University of Szeged, CRLI, *Hungary*
Mária B. Németh, University of Szeged, CRLI, *Hungary*

Among the plethora of approaches to and paradigms of reading development and achievements, longitudinal studies are scarce, even though these would be essential to identify general tendencies against which individual performances could be measured, as well as to determine more exactly the strength of factors known to exert influence on reading development. This paper discusses the first results of a large scale longitudinal study, focusing on how the developmental levels of basic skills of 6-year-olds relate to their reading performance 18 months later. A nationally representative sample of approximately 5000 6-7-year-old Hungarian children (grade 1, at the beginning of reading instruction) was selected. In October 2003, subjects were administered the DIFER test, a research-based, standardised instrument for the diagnostic assessment of basic skills (e.g. elementary arithmetic, social skills and the vocabulary of relations). In May 2005, the same subjects (then 8-9-year-olds) were administered a reading test, which included, corresponding to expected student performances, two text types and targeted two areas of reading literacy (information retrieval and interpreting texts). The results show that the developmental levels at the beginning of schooling have a marked influence on academic progress. Reading scores correlate strongly with the composite DIFER index (r=.52) and with parents' education (r=.42) and these two variables together explain a third of the variance of reading performance (DIFER index: 23%; parents' education: 10%). DIFER scores place students in five performance categories indicative of the stage they are in as regards the acquisition of the targeted skills. For subjects in the lowest categories, the instruction received between the assessment points was not enough to make a proper start in learning to read. The findings provide a strong case for the development of effective, research based early intervention programs in cognitive skills and in reading.

J 9
30 August 2007 17:00 - 18:20
Room: 0.100A
Paper Session

Situated learning

Chair: **Denis Alamargot,** MSHS - Universite de Poitiers, *France*

"The way she does? NO.": Intergenerational influences in everyday family financial matters
Veronique Mertl, University of Washington, Seattle, WA, *USA*
Laurie McCarthy, University of Washington, Seattle, WA, *USA*
Sheldon Levias, University of Washington, Seattle, WA, *USA*
Reed Stevens, University of Washington, Seattle, WA, *USA*

This study explores how families make financial decisions, focusing on the knowledge, resources, and practices shared between family members. Using ethnographic methods, we examined everyday discussions and activities about finances in the homes of eight families. These ranged from routine bill-paying practices and budgeting to major decisions, such as the selection of high-premium insurance policies and saving for a child's college education. Individual and group observations and interviews permitted us to assess the dynamics of the family as well as the perspectives of each family member. Studies have shown that what people learn and how people learn differs in important ways across informal and formal settings (Bransford et al., 2006). Therefore, it is important to understand how individuals create their own activities and pathways to learning. In this proposal, we explore how family members construct narratives around their financial practices and the intergenerational influences that affect these narratives. How has upbringing oriented both parents' and children's learning around money and finances? How do parental practices shape children's conceptions and practices around money matters? Our findings suggest multiple ways of learning that occur in family financial practices including an apprenticeship model where young children adopt parental financial practices (Rogoff, 2003). We also found young people using their parents' practices reflexively as a resource for developing alternative practices.

The world beyond: Contributions of experiences outside the classroom in unlocking children's learning
Sue Waite, University of Plymouth, *United Kingdom*

The UK government is beginning to recognise value in learning outside the classroom after a period of concentration on raising narrowly defined standards through didactic teaching methods. This paper reports on a study of outdoor experiential learning opportunities, examining attitudes, practice and aspirations of practitioners and children in educational and care settings for children between 2 -11 years within a rural county of England. Data collection methods included a county-wide survey, and interviews and observations within five case studies. The findings suggest that the governmental top-down initiative is being met to some extent by a groundswell of interest and aspirations for more creative ways to learn in the outdoors from both practitioners and children.

Investigating teachers' approaches towards mathematical problem-solving and its relationship with individuals' conceptions: A videobased study in sixth grade
Fien Depaepe, University of Leuven, *Belgium*
Erik De Corte, University of Leuven, *Belgium*
Lieven Verschaffel, University of Leuven, *Belgium*

During the last decades, a worldwide consensus grew that - instead of focusing on the acquisition of definitions, formulae and procedures - mathematics education should mainly aim at students' understanding, mathematical reasoning and problem-solving skills, attitudes and the disposition to use their skills in real-life situations. This reform movement was also influential in Flanders and resulted in the formulation of new standards for primary mathematics education. Meanwhile, these reform-based ideas have led to a new generation of textbooks for mathematics education in Flanders. This study reports on a seven-month-long observational study in two sixth-grade classrooms in Flanders in which the same mathematical reform-based textbook Eurobasis is used. We investigated whether – and if so, how – teachers fostered in students a metacognitive approach towards applied mathematical problem solving. In line with the textbook, we focused on the explicit and implicit reference to the metacognitive strategy developed in a previous study by Verschaffel et al. (1999) consisting of five stages: (1) build a mental representation of the problem, (2) decide how to solve the problem, (3) execute the necessary calculations, (4) interpret the outcome and formulate the answer, and (5) evaluate the solution. By subjecting all students to an in-depth interview, we investigated how the instructional approach towards such a metacognitive strategy affects students' perceptions and evaluations of the use of that strategy while solving mathematical application problems. We observed differences in both teachers' approaches towards mathematical problem solving: the first teacher used the tasks as a vehicle to meet higher order goals (i.e., (meta)cognitive skills), whereas the second teacher focused on students' acquisition of the procedures to come to the right solution. Moreover, we found evidence for the impact of classroom practices on students' individual conceptions concerning the value of a metacognitive approach towards mathematical application problems.

Constructing psychology: identity and discourse in an online community of practice
Carlo Perrotta, University of Bath, *United Kingdom*

The paper reports a study based on the application of James Gee's concept of recognition work to some of the discursive dynamics identified in an online CoP (Community of Practice). Discourse analysis was carried out on 20 online discussions (or "threads") and to 23 semi-structured interviews to understand whether, and how, a common professional identity was constructed. The findings demonstrate that the notion of recognition work can account for how identities are constructed and negotiated through discourse in CoPs, and suggest that more research is needed to understand the potential of computer-mediated communication in the recognition work of identities.

J 10
30 August 2007 17:00 - 18:20
Room: Konferencia
Paper Session

Motivation

Chair: **Krisztián Józsa,** University of Szeged, *Hungary*

An aptitude-treatment-interaction-approach on motivation and student's self-regulated hypermedia-based learning
Hermann Astleitner, University of Salzburg, *Austria*

Within this study, the effects of implementing motivational design of instruction within hypermedia were tested. Motivational design of instruction was based on the ARCS-model and resulted in strategies for increasing attention and relevance in respect to learning content. In addition, an aptitude-treatment-interaction (ATI)-approach was developed which related motivational design of instruction to mental resources management, motivational processing, pre-motivation, motivation to learn, and knowledge acquisition. There were four types of hypermedia teaching software (no ARCS, with attention-, with relevance-, and with both attention- and relevance-strategies) which were presented to elementary school students (n = 68). As dependent variables, the motivation to learn and knowledge acquisition after learning were measured. Pre-motivation (outcome-valence), pre-knowledge, and cognitive load represented covariables. Results indicated that a combination of both ARCS-strategies improved motivation to learn, especially for those students with low levels of pre-motivation. Pre-knowledge increased and cognitive load decreased knowledge acquisition. Finally, open research questions and methodological aspects are outlined. Also, suggestions for the design of instructional hypermedia are given.

The relationship between students' interest development and their conceptions and perceptions of group work
Alexander Minnaert, University of Groningen, *Netherlands*
Monique Boekaerts, Leiden University, *Netherlands*

In an attempt to measure interest development in the context of higher education, we systematically examined how students' conceptions and perceptions of the quality of learning experiences in innovative contexts affect their developing interest (Hidi & Renninger, 2006). By identifying and measuring the conceptions that student hold about the quality of social learning context and their perception of the actual learning conditions during group work, we tried to gain insight into the relative contribution of these two aspects of cognition to students' interest development. Participants were 102 first semester sophomores at a Dutch university. These students enrolled in a compulsory, introductory course in educational sciences that featured five lesson series and was structured according to a set of principles based on social constructivism. Structural Equation Modelling and multivariate analysis of repeated measures were used to analyse the longitudinal and reciprocal relationships between students' conceptions and perceptions and their developing interest. In line with Self-Determination Theory (Deci & Ryan, 1985), we predicted and found that opportunities to experiences competence, autonomy, and social relatedness, each representing a basic psychological need, facilitate situational interest. Students' conceptions about the quality of working in groups changed as a function of their situational interest, but different patterns were noted for learning and social interaction conceptions. The

results are discussed with reference to the teacher's role to monitor more closely the facilitating potentials of interest development.

Effects of teaching practices and teacher-efficacy on the development in students' motivation to learn
Erik Thoonen, University of Amsterdam, *Netherlands*
Thea Peetsma, University of Amsterdam, *Netherlands*
Peter Sleegers, University of Amsterdam, *Netherlands*

This study focuses on the effects of teaching practices on the development in motivation for school of students in primary schools in the Netherlands, and whether teacher-efficacy mediates this relationship. Due to ascertained declines in school motivation, new attention has been paid to new conceptions of learning and learning environments. It is expected that these new conceptions of learning, based on constructivist learning theories, can enhance students' motivation to learn. Also, studies have shown that teacher-efficacy may affect students' learning and achievement. Over 100 teachers and 1200 students in Grade 4 to 6 participated in this study. In a period of three years, teachers completed a self-report questionnaire concerning teaching practices and teacher-efficacy three times. Also, a student questionnaire was administered three times. This questionnaire included scales on well-being, academic self-efficacy, intrinsic motivation, goal orientations and school investment. Preliminary analyses suggest that teaching practices have small but significant effects on students' motivation to learn, particularly connection to students' world and differentiating between students. Furthermore, it seems to be that teacher-efficacy mediates this relationship. Further analyses will be performed to gain more understanding of these relationships in a longitudinal perspective.

Self-regulatory skills as mediator/moderator in the effect of motivation on performance
Hanneke van Nuland, Leiden University, *Netherlands*
Rob Martens, Leiden University, *Netherlands*
Monique Boekaerts, Leiden University, *Netherlands*
Toon Taris, Radboud University Nijmegen, *Netherlands*

More and more evidence is found that educational innovations fail because students' motivation is not as it should be (Boekaerts & Martens, 2006). This study is part of a series of experiments in a Dutch secondary vocational training context, in which it will be attempted to influence students' motivational orientation and as such their actual study behaviour with motivational why- and how-information. The aim of this first study was to enhance understanding of motivational processes and the effect on performance. In an online session, 224 Dutch secondary school students were presented with a problem solving task and questionnaires on situational goal orientation, intrinsic motivation, and self-regulatory skills (i.e., effort regulation; time management; metacognition). With hierarchical regression analysis it is investigated whether the effect of goal orientation and intrinsic motivation on performance (i.e., testscore and strategy use) is mediated or moderated by self-regulatory skills. Results showed support for a negative association between performance approach and strategy use, moderated by metacognition. Students with a performance approach orientation show less quality of strategy use, especially when their metacognition is below average. This unexpected finding can be explained with regard to the nature of this task. Students with a performance approach orientation aim at obtaining a quick performance result, whereas performing well on the music task with regard to quality of strategy use implies to vary only one variable at a time, which enhances understanding of the system, but reduces speed. Furthermore, the lower the score on performance approach orientation, the better the quality of strategy use,

provided that metacognition is below average. This indicates to believe that thinking of strategies and goals before engaging in the task, might withhold students from freely exploring, which is a prerequisite for efficiently performing this task. Further implications of these findings are discussed.

J 11
30 August 2007 17:00 - 18:20
Room: 3.67 Békésy
Paper Session

Peer interaction

Chair: **Markku Niemivirta,** University of Helsinki, *Finland*

Learning outcomes in peer learning practices
Hanne Riese, University of Bergen, *Norway*

This paper presents a meta synthesis of qualitative studies of learning processes that could be characterised as peer learning practices (Sampson, Boud, Cohen, & Gaynor, 1999). Peer learning as a concept is relatively new (Anderson & Boud, 1996), however the practice might be regarded as widespread also under other conceptualisations. The intention is to explore what kind of learning outcomes regarding process and product peer learning practices in various educational settings lead to. In order to address the question of learning outcomes in peer learning practices, a review and meta synthesis of qualitative studies on learning processes that are in accordance with the definition of peer learning practices will been conducted. Studies including settings that could be characterised by one or more of the following three characteristics are to be included: 1. Students are expected to work together with relatively little involvement of staff over semester or a whole year. 2. Students are expected to learn with or from each other in both formal and informal ways. 3. Students are expected to take responsibility for each other's learning in a setting often constructed by the students. Expected results will be on how conditions such as instruction, group structure, assessment, project character and teachers role will influence on learning outcome from peer learning practises. The results will be discussed with relation to the relevance of the concept as well as the theoretical base for peer learning practices. The question opens the possibility of exploring the relationship between the perspectives on the process of learning and the learning outcomes (Lillejord & Dysthe, forthcoming). Furthermore it will contribute to the understanding of how or in what ways peer learning may contribute in the development of a productive learning environment.

Stand by me: collaborative project work
Edgar Dias, Faculdade de Ciencias da Universidade de Lisboa, *Portugal*
Margarida Cesar, Faculdade de Ciencias da Universidade de Lisboa, *Portugal*

Being a critical and active citizen in a knowledge-based society demands not only being able of working collaboratively, but also requires statistical literacy. According to policy documents, namely Portuguese ones, project work is one of the learning experiences that all students should have the opportunity to engage in (Abrantes, Serrazina, & Oliveira, 1999). They are one of the means that facilitate the connections between mathematics and daily life allowing students to give

a meaning to their mathematical knowledge which is underlined as essential by several authors (Gravemeijer, 2005; Schoenfeld, 2005). This study is a part of the research project Interaction and Knowledge whose main goal is to study and implement collaborative work in learning settings (5th to 12th grades). The data were collected in six 10th grade classes (15/16 years old). Data collection instruments were participant observation (two observers: the teacher and the researcher; some classes were audio and video taped), questionnaires, interviews and documents. The collaborative project work was developed in the content of statistics, during the 2nd and the 3rd terms, in twelve to fifteen 90 minutes classes, every fortnight. These students worked collaboratively since the beginning of the school year. The mathematics teacher is experienced in collaborative work and she usually implements it in her classes and when working with other teachers. Students chose the theme of their class project work and they planned every detail. The results underline the role played by the collaborative project work as a mediator and facilitator of the transitions from students' previous knowledge and life experiences, and academic knowledge and competencies. Results also illuminate that project work associated to collaborative work is a powerful tool for statistics learning and for the development of social, cognitive and affective competencies as illustrated by the analysis of several examples of students' work and quotations.

Do peer social experiences predict academic participation in the early school years?
Denyse Blondin, Universite du Quebec a Montreal, *Canada*

Recent studies in psychology and education suggest that socioemotional factors, among them peer social experiences, can predict student's participation in classroom activities as much as cognitive factors do, according to traditional lines of research in education (Ladd, Birch and Buhs, 1999; Furrer and Skinner, 2003). Connell & Wellborn's (1991) motivational model define social experiences with peers, teachers and parents as different forms of contexts that can offer learning structure, autonomy and emotional support. When it is the case, these contexts become potential sources of motivation by means of combined processes linked with three (3) basic needs: competency, autonomy and relatedness. The effect of these contexts is observed in various forms of engagement: active engagement also referred to as participation, autonomous engagement and affective engagement. The research aimed to verify the following hypothesis: peer social experiences for children between 5 to 7 years old could serve as a motivational context that predicts participation in classroom leaning activities. 241 children participated in the study based on a predictive correlational design. Three (3) instruments served to measure peer social experiences. Peer nominations (Coie, Dodge & Coppotelli, 1982) were used to measure group approval, peer rating for friendship (Berndt, Perry & Miller, 1988) and peer network free recall nominations (Gest & al., 2001). A questionnaire was sent to the teacher in relation to the pupil participation in learning activities, The Teacher Rating of School Adjustment (TRSSA) developed and updated by Birch and Ladd (1997). Data was gathered at two different times (February and May) of the same school year, considering pupils' age and cognitive maturity. The results show that the model tested can explain 27% of the variance about the pupil's participation in learning activities. Discussion includes tentative explanations for these results and possible future avenues of research.

The dynamics of sociometric and self-reported peer acceptance and academic achievement
Kathrin Jonkmann, Max Planck Institute for Human Development, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Oliver Lüdtke, Max Planck Institute for Human Development, *Germany*

Successful school adjustment requires students to develop and perform a wide range of academic as well as social competencies. In addition to academic achievement, students strive to establish and maintain interpersonal relationships and to behave in ways that are valued by classmates and teachers (Wentzel, 2003). In the current study we investigate the interplay of two major aspects of the academic and social domains – school grades and peer acceptance - and their prediction of another important outcome of successful school adjustment, namely academic self-concept. As peer acceptance is by definition a contextual phenomenon we further ask if these associations systematically vary between classes reflecting different classroom norms. This multi-level question has been neglected by most sociometric research so far. The empirical basis of the investigation provides a sample 2,357 7th graders (mean age = 13.3 years; 56.1% female) from 140 classes. Peer acceptance was measured in two ways: by sociometric positive and negative peer nominations and by a self-report scale. Academic self-concept was assessed by a well established six item scale. Achievement was operationalized as grade point average. Data analysis combined bivariate and multivariate latent analysis and multi-level modelling. The results indicated that, in line with previous research, grades predicted sociometric peer acceptance. Moreover, grades also predicted self-reported peer acceptance. All constructs showed direct or mediated effects on students' academic self-concept. The multi-level analysis suggested that these associations were universal across classrooms. Future directions for a multi-perspective view of classroom dynamics and classroom norms will be discussed.

J 12
30 August 2007 17:00 - 18:20
Room: Harmónia
Paper Session

Special education

Chair: **Éva Molnár,** University of Szeged, *Hungary*

Structured Flexibility
Mona Holmqvist, Kristianstad University, *Sweden*

In this article a study of how six participants, diagnosed with autism or Asperger syndrome, developed independency in daily living activities is presented. Combined with using structure and routines in the learning situation, flexibility by the use of limited variation was evoked. Based on video recorded observations of the participants' behaviour and theoretical assumptions of what it takes to learn, intervention in six case studies was carried out. The learning outcomes were analysed in terms of how the participants' abilities to discern, discern single aspects simultaneity and handle variation in the learning situation affected the learning outcome. The analyses consisted of the comparison between the participants' initial ability with the achieved ability after the intervention. All six children who participated improved their targeted abilities, which were measured by analyses of video documented situations in natural settings, shown by differences in

how they performed in their daily living activities before, during, after and 3-6 weeks after the intervention. The results show stability over time. In this study, variation theory has been used to analyse what the respondents are able to discern in the environment, and what they seem unaware of. The results show that the theoretical framework can be used in planning teaching activities for children with autism, as its strong focus on the intended object of learning and what it takes to learn. This focus results in a change direction from planning instruction based on the observable behaviour towards a plan based upon theoretical way to predict further learning possibilities. The results point out the advantage of making the student focus on the connections between different aspects discerned simultaneously evoked by variation rather than focusing one single aspect at a time.

Metacognitive knowledge, attitudes and self-perceptions of writing: A study of middle school students with developmental disabilities and learning difficulties
Christina E. van Kraayenoord, University of Queensland, *Australia*
Karen B. Moni, University of Queensland, *Australia*
Anne Jobling, University of Queensland, *Australia*
John Elkins, University of Queensland, *Australia*
David Koppenhaver, Appalachian State University, *USA*
Robyn Miller, University of Queensland, *Australia*

In this article a study of how six participants, diagnosed with autism or Asperger syndrome, developed independency in daily living activities is presented. Combined with using structure and routines in the learning situation, flexibility by the use of limited variation was evoked. Based on video recorded observations of the participants' behaviour and theoretical assumptions of what it takes to learn, intervention in six case studies was carried out. The learning outcomes were analysed in terms of how the participants' abilities to discern, discern single aspects simultaneity and handle variation in the learning situation affected the learning outcome. The analyses consisted of the comparison between the participants' initial ability with the achieved ability after the intervention. All six children who participated improved their targeted abilities, which were measured by analyses of video documented situations in natural settings, shown by differences in how they performed in their daily living activities before, during, after and 3-6 weeks after the intervention. The results show stability over time. In this study, variation theory has been used to analyse what the respondents are able to discern in the environment, and what they seem unaware of. The results show that the theoretical framework can be used in planning teaching activities for children with autism, as its strong focus on the intended object of learning and what it takes to learn. This focus results in a change direction from planning instruction based on the observable behaviour towards a plan based upon theoretical way to predict further learning possibilities. The results point out the advantage of making the student focus on the connections between different aspects discerned simultaneously evoked by variation rather than focusing one single aspect at a time.

Language difficulties and educational achievement
Julie Dockrell, Institute of Education, London, *United Kingdom*
Geoff Lindsay, University of Warwick, *United Kingdom*
Olympia Palikara, Institute of Education, London, *United Kingdom*

Rationale: Striving for better academic outcomes for all young people is a key feature of current educational policy. Young people with a history of specific language impairments (SLI) are a vulnerable group. Previous research is limited but the indication is that these pupils have low

levels of academic achievement at the end of formal education and increased risk of unemployment in adult life. The current study addresses these issues by 1) examining the academic and literacy attainments of children with a history of specific language and communication difficulties at the end of compulsory education (age 16) in the UK 2) by describing their post sixteen destinations in relation to further studies and work and 3) examining the extent to which early cognitive, language and literacy scores predict educational achievements. The data are derived from a longitudinal study of a cohort of children identified as experiencing a specific language impairment at the age of 8 (Dockrell et al., in press; Lindsay et al, 2000). Participants: A cohort of 69 children identified with a specific language impairment at age 8 were followed through elementary school and High school. Participants subsequently completed standardised assessments of language, reading, spelling and writing at ages 10, 14 and 16. Results: The participants continued to experience problems with oral language and language levels were significantly poorer than nonverbal skills. The majority of participants achieved some level of success in national exams at the end of formal education . Both levels of writing and numeracy skills were significant predictors of performance. The majority of young people continued into further education. Conclusion: This study extends our understanding of the long term impact of early specific speech and language difficulties. Early oral language difficulties are later manifested as literacy problems. These difficulties are a barrier to later academic success.

Decoding and spelling errors of secondary students with learning disabilities
Souzana Padeliadu, University of Thessaly, *Greece*
Faye Antoniou, University of Thessaly, *Greece*

The purpose of the present study was to document the errors secondary school students emit in decoding and spelling. Participants were 55 students, diagnosed as having LD using State-identification criteria. The decoding tasks involved reading aloud an equal number of words and pseudowords (N=25 each) which were presented interchangeably and in order of ascending difficulty. Students' errors were coded as addition, substitution, omission, reversal (separately for phonemes and syllables) and stress ones. Spelling was evaluated by writing 76 words (read by the examiner as part of a sentence). The errors were coded as phonological, historical, morphological, and stress ones. Results indicated that (a) the most frequent decoding errors involved phoneme and syllable substitution and stress errors, and (b) the most to least frequent spelling errors involved stress, morphological type errors, historical spelling, and spelling errors of phonological type. When regressing spelling on decoding, the linear combination of the latter explained variance levels between 13% and 31%. It is concluded that spelling has a strong decoding basis and that those errors seem to persist in adolescence. Thus, at the secondary school level, teachers need to evaluate and monitor the basic/prerequisite skills of reading and spelling.

J 13
30 August 2007 17:00 - 18:20
Room: 0.100B
Paper Session

Teacher education

Chair: **Iván Falus,** ELTE University, *Hungary*

Assessing teachers/ counseling-competence: a multicriterial-multimethod approach
Silke Hertel, University of Technology Darmstadt, *Germany*
Bernhard Schmitz, University of Technology Darmstadt, *Germany*

Objectives Counselling parents is a main task of the teacher profession but there is basically no research concerning this competence.Or aim was to evaluate a multicriterial-multimethod assessment approach measuring teachers counselling competence and permitting differentiated performance feedback and deficit-orientated assignment to specific treatments. Design & Method The data was collected during an intervention study (two by two by two (training,reflection,feedback:yes/no)design).Assignment to conditions was randomized or parallized.98 teachers from german schools volunteered to participate.The competence assessment was based on six instruments: self-assessment-questionnaire (trait- and state-level,written work-samples,knowledge-tests and ((non-)participating)ratings in simulated counselling-interviews.Counselling-competence was operationalized through five criteria identified in pre-studies (reflectiveness,cooparative alignement,methods (e.g. verbal strategies,diagnostic-competence),goal-orientation,criticism-coping.We conducted analyses of correlations and analyses of variance with repeated measures. Results The instruments were reliable and objective (Alpha>.75;Kappa>.8).The competence measures from different instruments correlated significantly.We found correlations between competence-level and perceived performance in counselling-interviews(trait-level:r=.58***).Thus,teachers with higher counselling-competence had higher scores for perceived perfomance. Teachers participating in the training improved their competence significantly (state-level:F=18,83***;knowledge-test:F=46,4***). Conclusion The correlations of competence measures from different instruments indicate internal valitity.The correlation of competence-level and perceived performance indicate external validity.Teachers counselling-competence can be improved by a training.Further research should investigate optimisation potential regarding competence assessment.

Remembering our teachers: Retrospective evaluation of teaching
Rachel Arnon, Beit Berl College, *Israel*
Pnina Frenkel, Levinsky College of Education, *Israel*
Hava Greensfeld, Michlalah Jerusalem College & Beit Rivka College, *Israel*
Edna Rubin, Achva College of Education, *Israel*
Tali Zeiger, Beit Berl College, *Israel*

This study examines the issues raised in memories of excellent and poor teachers, as well as the meta-cognitive dimensions connected with these memories, such as the ease of memory, the length of the memory, and the role of the subject in them. Our assumption regarding the importance of retrospective evaluation is based on prior studies on autobiographical memory. 349 young adults received either an open-ended questionnaire that asked them for written descriptions of one teacher they remember as "excellent " and one they remember as "terrible" or a "closed" questionnaire in

which they were asked to evaluate one "excellent" teacher, one "mediocre" teacher, and one "terrible" teacher based on a given set of criteria. A content analysis of the descriptions based on a model for the descriptions of teachers developed by us in a previous study, as well as a regression analysis of the evaluations, revealed a limited number of characteristics related to the cognitive-organizational aspect and the personal-social aspect of the teacher's actions. As expected, the study did not find a perfect symmetry in the issues focused on in memories of the two groups of teachers. Aspects related to poor motivation and failed classroom management were addressed in the descriptions of "terrible" teachers, but not in those of "excellent" teachers. The descriptions of "excellent" teachers tended to be significantly longer and more easily recalled than those of poor ones. These findings point to the unique issues that should be addressed in teacher training and evaluation.

Making orgnanizational learning in teacher education visible: A theoretical model and case study
Charles Peck, University of Washington, *USA*
Chrysan Gallucci, University of Washington, *USA*
Tine Sloan, University of California, Santa Barbara, *USA*
Ann Lippencott, University of California, Santa Barbara, *USA*

Despite intense and growing pressures for change in teacher education, relatively little research has directly investigated change processes within these programs. We used a socio-cultural theory of learning to examine how individual and collective processes of learning and change took place a teacher education program during an eighteen month period of adaptation to a set of new state policy mandates. Findings suggest this framework may be useful as a lens for analysis and strategic support of organizational learning processes within programs of teacher education.

Weblogs as instruments for reflection-on-action in teacher training
Iwan Wopereis, Open University of the Netherlands, *Netherlands*
Sybilla Poortman, Fontys University of Professional Education, *Netherlands*

The study aims at unfolding the potential of weblogs as instruments for reflection-on-action during apprenticeship. It is hypothesized that weblogs are suitable for enhancing reflection in teacher training. Weblogs are easy to access and above all fit for community supported (reflective) learning at a distance. They are assumed (a) to solve problems like postponing reflective activity and (b) to promote reflective dialogue, since instant feedback-on-action by peers and teachers is possible. Three groups of student teachers (n=20) from two teacher-training institutions participated in this study. Two groups (n=9; n=3) included freshmen; one group (n=8) was a group of third-year teacher college students. After being instructed how to use the weblog and how to reflect-on-actions during apprenticeship, the students were asked to reflect on their teaching experiences during a ten week lasting internship. In addition the students were also asked to give feedback on each other's weblog contributions. After this ten-week period the students were interviewed group wise and were asked to fill in questionnaires individually. Further, the writings (posts and comments) in the weblogs were analysed quantitatively and qualitatively. Results show that students are reasonably involved (active) in reflective writing. However this reflective activity is not profound. Especially freshmen confine themselves to descriptions of incidents. Incidentally they describe a spiral process, where new and alternative actions are based on self-evaluation or (peer) feedback. Deep reflection and meta-reflection are sparse, although more frequently observed in the analysis of the third-year teacher college students. Concluding, it can be said that weblogs, as instrument for reflection-on-action, have potential. Well-designed, the instrument can stimulate reflective activity and serve as an instrument for meta-reflection in a digital portfolio.

However, good procedures for learning how to reflect-on-action and giving constructive feedback-on-action remain crucial.

J 14
30 August 2007 17:00 - 18:20
Room: 1.60
Paper Session

Instructional strategies

Chair: **Tamara van Gog,** Open University of The Netherlands, *Netherlands*

Evaluating the effects of a metacognitively-rich pedagogy in primary classrooms: ACTS in Northern Ireland.
Carol McGuinness, Queen's University Belfast, *United Kingdom*
Angela Eakin, Queen's University Belfast, *United Kingdom*
Brendan Bunting, University of Ulster, *United Kingdom*
Noel Sheehy, Queen's University Belfast, *United Kingdom*

The paper presents findings from a study that evaluated the effects a metacognitively-rich pedagogy on children's thinking skills in primary classrooms. ACTS (Activating Children's Thinking Skills) adopted an infusion methodology where a curriculum topic and a specific pattern of thinking were taught together. The theoretical perspective with regard to children's learning focused on the development of their metacognitive capacities - on their ability to become proactive about their learning in terms of planning, monitoring and appraising their thinking. Comparisons were made between a group of control children ((N=548, 25 classes) and two groups of children who participated in the intervention for different lengths of time: ACTS 1/2 Years (N=412, 17 classes) and ACTS 3 Years (N=292, 12 classes). The main finding was that participating in ACTS had a statistically significant positive effect on how children rated themselves with regard to their use of cognitive and metacognitive strategies, their willingness to work harder and to put in more effort. The pattern was characterized as a pro-active learning effect. However, the changes took time to build and were not even across all learners. The implications of the findings for policy, and for classroom practices for teaching thinking, are discussed.

Comprehension instruction and development of reading motivation in four Norwegian 9th grade Language Art classrooms
Oistein Anmarkrud, University of Oslo, *Norway*

The study examines the comprehension instruction and teachers support in development of reading motivation in four 9th-grade classrooms in Norwegian lower secondary school. The research design is a classroom study, with video recordings from the classroom and teacher interviews as the primary data source. The analysis is based on 16 video taped lectures of Language Art from four different schools. In the 16 lectures, students read expository text. The video data has been analyzed with two levels of categories. The first level of categories focuses on teaching and instructional formats, organisational structure, activities and patterns of interaction in the classroom. The second level of categories examined the teachers' instruction in comprehension strategies and their support for development of reading motivation. Overall there is little explicit

instruction in comprehension strategies in the four classrooms. Teachers encourage students to be strategic readers, but they seldom model and verbalize the use of comprehension strategies. The dominance of the whole class format in strategy instruction, leads to little scaffolding of the individual students strategy use. Support for reading motivation is not a frequent activity in the classrooms. The development of reading motivation mainly occurs within the format of group work and individual seat work. Development of reading efficacy seems to be the focus of this interaction. The interviews expose large variation in teachers' knowledge of text comprehension, comprehension strategies and, reading motivation. In general the teachers seem to lack the procedural knowledge of comprehension instruction, and the need for such procedural knowledge is something all the teachers express in the interviews. The study indicates that teachers need procedural knowledge of how to give comprehension instruction, not just declarative knowledge of different comprehension processes.

Standards in teacher education and transition to profession: Analysis of achievement levels in teaching competency
Matthias Baer, University of Education, Zurich, *Switzerland*
Gunter Dorr, University of Education, Weingarten, *Germany*
Titus Guldimann, University of Education St. Gallen / Rorschach, *Switzerland*

The paper presents aims, methods and results of a research project in which three Universities of Education in Switzerland (Zurich and St. Gallen / Rorschach) and Germany (Weingarten) are involved. The study provides a longitudinal analysis of the development of teaching competencies from the beginning up to the end of teacher training and into the first year in profession. The teaching competencies of a sample of teacher students are measured at the beginning of teacher training, throughout the three years of teacher training as well as at the beginning and the end of their first year in profession. Theoretically, our study is based on Oser's (1997, 2001) professional standards, as well as on the four dimensions 'subject matter knowledge', 'diagnostical knowledge', 'didactical knowledge', and 'knowledge' of class room management which have been proposed as teachers' crucial competencies (Helmke & Weinert, 1997; Beck e al. 2006). A combination of different instruments is used to investigate how teaching competencies develop during teacher training and the first year of occupation including (1) questionnaires for students and teachers, (2) vignettes, (3) a video test, and (4) video analyses of school lessons. Our study aims at understanding the development of complex teacher knowledge in order to foster the acquisition of professional teacher competencies in pre-service teacher training. The results for the first two years of teacher training not only show (a) an overall increase in teaching competency for each year of teacher training, but also (b) different effects of teacher education at the three involved universities. Oser's standards and the four dimensions by Helmke & Weinert are helpful for understanding the development of teaching competency. We expect to be able to present the complete set of results (third year of training included, but not the first year in profession) at the time of the conference.

Changes in teacher beliefs about motivation and instruction: A collaborative study
Julianne Turner, University of Notre Dame, *USA*
Tim Urdan, Santa Clara University, *USA*
Andrea Christensen, University of Notre Dame, *USA*

Changes in middle grade teachers' beliefs about motivation and learning in mathematics, and related changes in instructional strategies, were investigated during a year-long collaboration at two sites in the U.S. At monthly meetings, teachers (N=11) and 2 university researchers discussed

four research-based principles of motivation and developed strategies to implement them in classroom instruction. They included fostering students' competence, autonomy, belongingness and interest in mathematics. A sociocultural perspective, which assumes that individuals develop and change through participation with others in social and cultural activities, informed data analysis. Data included transcripts from 9 teacher meetings and at least 2 interviews with each teacher conducted while viewing videotapes of their classroom instruction. Transcripts and interviews were coded inductively to describe changes in teacher beliefs and practices related to motivation and learning. Three patterns emerged. One group of teachers changed both beliefs and practices. They could articulate theoretically consistent views of how motivation principles related to student learning and motivation. A second group of teachers made successful changes in practice, and noted changes in student behaviors (e.g., more participation), but did not articulate how and why principles and practices supported such behaviors. A third group of teachers did not change beliefs or practices. Several strongly held beliefs may have prevented change. Teachers voiced strong convictions that students needed a structured and predictable environment, interpreted as teacher-centered transmission-style instruction. They did not take the "student view" as teachers in other patterns did. In addition, these teachers saw motivation and achievement as stable, thus negating the impact that changing practices might have on student motivation and learning. These findings will be discussed in relation to research on teacher views of motivation, on teacher conceptual change, and on how motivation theory and research can understand and interpret the dynamic nature of development and change.

J 15
30 August 2007 17:00 - 18:20
Room: 7.59
Paper Session

Academic learning

Chair: **Sari Lindblom-Ylänne,** University of Helsinki, *Finland*

Developing potentials for learning in higher education: Working as a graduate research assistant
Michelle K. McGinn, Brock University, *Canada*
Mary Lovering-White, Brock University, *Canada*
Ewelina Niemczyk, Brock University, *Canada*
Julie Dixon, Brock University, *Canada*

Postgraduate students who work as research assistants are expected to learn about research and about academic life. However, very little is known about the day-to-day workings of research assistantships because few scholars have investigated the learning opportunities available for research assistants. The purpose of this paper is to investigate the interactions between a professor and a postgraduate student during a research assistantship. The postgraduate student was actively involved in all data collection, analysis, and presentation activities related to an interview-based study of research education in social science disciplines. This paper draws from audiotapes of weekly research meetings, fieldnotes and research journals written by the professor and research assistant, and draft documents created throughout the research assistantship. Consistent with the conference theme, this paper focuses upon learning potentials within the research assistantship.

Interventionist writing in research and developmental projects
Pirjo Lambert, Helia University of Applied Sciences, *Finland*

Writing is a crucial element in research and developmental projects. However, the question remains: how to write within a project so that the writing will promote the project, and support the practical application of the new models and tools created in the project? This paper will report on a current research and developmental project (Lambert & Vanhanen-Nuutinen 2005), in which a new writing genre in Finnish universities of applied sciences is in the process of being developed. The project draws on the framework of Developmental Work Research (Engestrßm 1987), in which developmental interventions are an integral aspect of the methodology. The writing of teachers and their partners within projects has been developed with the help of a new tool for writing, called the Writing Plan. In this paper, I will discuss the question of how to develop interventionist writing, and produce the texts that do not only describe the change obtained, but also aim at producing the change. Interventionist writing is one way of writing in the genre ecology (Spinuzzi 2003), and may carry a potential to a new emerging writing genre: a genre of development.

From PhD Students to professional researchers – the question of literate expertise
Kirsi Pyhalto, Helsinki University, *Finland*
Kirsti Lonka, Helsinki University, *Finland*

Language is the key cultural tool that mediates learning, thus acquisition and use of writing are powerful factors in the development of scientific thinking (Olson, 1994; Scardamalia & Bereiter, 1991). Further, writing is also a form of participating and becoming a member of scientific community and culture (Dysthe, 1993; Lea & Street, 1998). In the present study, the PhD students' ideas and practices of writing are analysed both empirically and theoretically in a framework of recent research results on learning and motivation. Moreover, an instrument for studying PhD. students' perceptions of writing, often tacit in nature, will be presented. This study is a part of a larger national research project on PhD. Education, at the Helsinki University, Finland. The participants were 602 medical, educational, arts and psychology major doctoral candidates who responded in a survey questionnaire. The survey consisted of both Likert- type statements and open ended questions. Preliminary results suggested that some problems in scientific writing, such as blocks and procrastination, perfectionism and seeing writing as the result of innate ability and repetition were all negatively related to experienced productivity and were related to prolongation in PhD studies. Also sense of isolation and lack of feedback and social support were related to prolongation. Most PhD students, even those who were composing a summary of articles, reported that they worked mainly alone. It could be concluded that there seems to be an urgent need for a more efficient means to foster literal expertise in Ph.D. students. More attention should also be paid on developing PhD training as a meaningful entity, for instance, by providing a collaborative and activating learning environment not only for PhD students, but also for their supervisors.

Non-university trained students entering university master programmes: a comparison in study performance, study approach, social integration and generic skills.
Jessica Steur, University of Groningen, *Netherlands*

Universities have to deal with a growing diversity in students entering their master programmes. More and more students with non-university bachelor training enter master programmes. Before entering the master programmes, they have to complete a premaster programme. There is some concern on the capabilities of these students, especially with regard to generic skills. From a

previous study it appeared that professional bachelors experienced some difficulties with the required study approach. They also did not feel adequately prepared for the master programme. The present study focuses on a growing group of professional bachelors who desire to complete a university master programme. Are they well-enough equipped to be successful in master programmes? The present study is a continuation and compares professional bachelors with academic bachelors in study performance, study approach, social integration and academic integration during their master programmes. This survey study yields two measurement moments: the first at the beginning of the master programmes and at the end of the one year master programmes. It was performed within four faculties. Some faculties succeed better in preparing professional bachelors than others. Especially in the field of generic skills differences occur between professional bachelors and university bachelors. These results will lead to recommendation to adjust premaster programmes for professional bachelors.

J 16
30 August 2007 17:00 - 18:20
Room: 0.99
Paper Session

Student learning in higher education

Chair: **Cees Terlouw,** Universiteit Twente, *Netherlands*

Self-regulated learning: The relationship between students' motivation, use of learning strategies and exam-results
Christian Brandmo, University of Oslo, *Norway*
Marit S. Samuelstuen, Norwegian University of Science and Technology, *Norway*

The aim of this study was to examine the relationship between students motivation, use of learning strategies and exam-results across different courses. During the past two decades, motivation and learning strategies have been central components in most models on self-regulated learning. Nevertheless, few studies have examined the relationship between motivation, learning strategies and learning outcome in ecologically valid settings. Therefore, we designed a study to examine these relationships. Participants were 164 second-year students from a prestigious private business management school. We used a Norwegian version of Motivated Strategies for Learning Questionnaire by Pintrich et al.(1991) to assess students' motivation and strategies, and adapted the three measures of goal orientation from Midgley et al. (1998). Based on exploratory factor analyses we identified eight scales; mastery goal orientation, performance-approach goal orientation, performance-avoidance goal orientation, self-efficacy, task value, surface processing, deep processing, and social strategies. These were used as predictors in preliminary multiple regression analyses in our ongoing study. As outcome indicators we included four written school exams representing three different courses. The self-report questionnaires were administered four weeks prior to the exams. To examine the time-stability, we included a follow-up exam 3 months later for one of the courses. The preliminary results indicate the same tendency across different courses from the same domain. Performance-approach goals seem to be the strongest predictor for exam performance in all courses. These findings supports former results from Harackiewicz et al. (2002) and Elliot et al. (1999), suggesting that performance-approach goals can lead to positive outcome in some academic settings. So far, these findings also challenge the common

understanding that mastery-goals as well as deep processing facilitate academic achievement. Further examinations of these issues will be highlighted in our ongoing research.

The learning approaches and epistemological beliefs of university students: A cross-sectional and longitudinal study
Lourdes Rodriguez, University of Granada, *Spain*
Francisco Cano, University of Granada, *Spain*
Maria Cardelle-Elawar, University of Arizona, *USA*
Marcelo Carmona, University of Granada, *Spain*

Note: An extended version of this manuscript has been accepted for publication in Studies in Higher Education and it is in the latest stage of revision. Abstract The Learning Approaches and Epistemological Beliefs of University Students: A cross-sectional and longitudinal study Abstract By carrying out both cross-sectional and longitudinal studies on groups of student teachers, we investigated whether tertiary education had an effect on two aspects of their learning experience (epistemological beliefs and learning approaches) and on the interrelations between them. The results of both the cross-sectional (n = 173 first-year and 215 final-year participants) and the longitudinal study (n = 81 participants) appeared to show that in general these two aspects of learning move in the direction of greater sophistication (epistemological beliefs) and depth (learning approaches) between first and final years of study and become more coherently interrelated, as was demonstrated by canonical correlation analyses. However, this result emerged only in the longitudinal study, where the same students' responses were being analysed and even in this study, the changes were not homogenous. A cluster analysis of intra-individual changes showed that while some students developed more mature beliefs about knowledge and learning and a deeper approach, the learning experience of others showed no improvement in quality. Discussion of the low impact of tertiary education on students' learning experience, the methodological contributions offered by this study and future research perspectives follow.

Perception of medical students on self-regulated learning skills: experience in problem-based learning and conventional curriculum
Sevgi Turan, Hacettepe University Faculty of Medicine, *Turkey*
Ozcan Demirel, Hacettepe University Faculty of Education, *Turkey*
Iskender Sayek, Hacettepe University Faculty of Medicine, *Turkey*

Self-regulation is an important skill for development of lifelong learning skills. The aim of the study is to investigate students' self-regulated learning skills at medical faculty implementing different curriculum model. The study, which is descriptive, carried out on five different medical faculties implementing different curriculum model. 918 of medical students took part in the study. A Self-regulated Learning Perception Scale (SRLPS) was developed and administered. Items were rated on a five-point Likert scale in the scale. Cronbach a for SRLPS that consists of four dimensions were 0.88, 0.91, 0.83 and 0.76, respectively. There was no statistically significant difference of SRLPS scores between genders but was significant difference between phases, curricular language and faculty's curriculum model. Students' scores of the medical faculty of which they applied a learner-centered curriculum with problem-based learning were higher than students of other faculties. It was also determined significant difference on motivation and action to learning scores (dimension 2) between students whose secondary school was used learner -centered method. The findings of this study indicate that the importance of learner -centered curriculum is to be achieved through self-regulated learning skills.

The role of social integration and peer relationships in the persistence of first-year students at university: analysis of determinants and effects.
Julia Schmitz, Universite catholique de Louvain, *Belgium*
Mariane Frenay, Universite catholique de Louvain, *Belgium*
Sandrine Neuville, Universite catholique de Louvain, *Belgium*
Gentiane Boudrenghien, Universite catholique de Louvain, *Belgium*

In Belgium, drop-out and failure risks are particularly high for the first-year university students. The transition from secondary school to university is a challenging period implying important changes in students' social life (i.e. distance to pre-college friends and family). Tinto's Integration Model (1997) emphasizes the role of social integration in students' persistence process. This study aims on one hand, to analyze the impact of social integration and peer relationships (i.e. peer affiliation, peer support) on first-year students persistence, and on the other hand, the understand to role of teacher practices (i.e. teacher support, opportunities for peer collaboration and low competition behaviour) as predictors of social relations and persistence. A more specific purpose is to examine the additive impact of emotional and academic factors in the persistence process. 405 first-year students from two Belgian universities were surveyed twice (September-November 2006). First results indicate that social integration and peer relationships play a central role in the first-year students' persistence intention, beyond individual characteristics and teacher practices. Even if academic engagement (i.e. academic efforts and course attendance) and social loneliness predict students' persistence intention, social integration and peer relationships remain strong and directly related predictors of the persistence intention. Moreover, teacher practices have positive and direct impact on both social relations and students' persistence intention. Some theoretical and practical implications will be assigned.

J 17
30 August 2007 17:00 - 18:20
Room: 0.83 Eötvös
Paper Session

Problem solving

Chair: **Lucia Mason,** University of Padova, *Italy*

Influence of mathematical and situational rewording on word problem solving
Santiago Vicente, University of Salamanca, *Spain*
Jose Orrantia, University of Salamanca, *Spain*
Lieven Verschaffel, Katholieke Universiteit Leuven, *Belgium*

Arithmetical word problem solving has a double nature: mathematical and textual. Because of this double nature there are several cognitive processes underlying the word problem solving process that are related to the comprehension of the word problem as a text and as a mathematical structure and that have some influence on children's achievement on this task. Based, first, on computational models, coming from the domain of word problem solving but also from text comprehension, which simulate the cognitive performance of children when solving word problems, second, on studies that have used the rewording methodology for empirically testing these computational models, and finally, on theoretical models and empirical studies that have

accounted for the positive effect of including drawings on text comprehension and word problem solving, four empirical studies were designed in order to check the effectiveness of two different ways for rewording word problems: conceptual and situational. Conceptual rewording was designed to highlight the underlying semantic/mathematical structure of the problem, while situational rewording focused on the enrichment of the situational context in which the problem was embedded, by making the temporal and causal structure of the situation explicit. Furthermore, the fourth study included drawings linked to each of the two kinds of rewording. Results showed that conceptual aids, both textual and pictorial, were the most useful for children in solving word problems, while situational aids had very little effect on children's achievement.

Improving students' evaluation of informal arguments
M. Anne Britt, Northern Illinois University, *USA*

Three experiments investigated students' ability to detect structurally flawed arguments. In Experiment 1, undergraduates frequently failed to notice when arguments were unsupported (claim with no reason) or unwarranted (claim supported by an unrelated reason). A paper-and-pencil tutorial improved performance only on the unsupported claim items. In Experiment 2a, the tutorial was modified to include training to pay attention to the predicate of the claim. This tutorial was effective in training students to detect unsupported arguments, but only immediate feedback during practice was effective in improving unwarranted arguments. Experiment 2b replicates these results with a web-based version of the tutorial. Future research will address the impact of learning to evaluate arguments on students' comprehension and production of arguments.

Imitative problem solving and the illusion of understanding
Ian Robertson, University of Bedfordshire, *United Kingdom*

It has long been known that students often assume they understand a new topic better than they actually do. This has been termed "surface" or "primary" understanding or the "illusion of understanding". This paper relates the illusion of understanding to the early processes of problem solving characterised by imitation. Imitative problem solving is a subtype of analogical problem solving where lower order elements are mapped from one source problem to the current target problem without being governed by a hierarchical understanding of the relations between the problem elements. In spite of this, students often believe that they understand the example (the source). I report two experiments where students assert a high level of understanding of an example problem but little evidence that they can transfer that understanding to a new problem of the same type. The results are interpreted as showing that the illusion of understanding comes about because students believe they can imitate the example problem but do not have enough domain knowledge to adapt the example to solve an exercise problem that varies from it.

The effectiveness of problem based economics: A summary of two promising studies
Jason Ravitz, Buck Institute for Education, *USA*
John Mergendoller, Buck Institute for Education, *USA*
Nan Maxwell, California State University, East Bay, *USA*
Thomas Smith, University of Illinois at Chicago, *USA*
Helen Roberts, University of Illinois at Chicago, *USA*

This paper summarizes a problem based approach for teaching economics and the results of two studies concerning the effectiveness of this approach, one in high school and one in college. Both studies aimed to compare the effectiveness of the problem based approach and traditional

instructional approaches in developing students' economics knowledge. Both studies used within-teacher designs and provide evidence of benefits for learners who received the problem based approach. The first employed 5 high school teachers of 346 students and examined differences in pre-post content knowledge on multiple choice tests, including for students who demonstrated different levels of verbal ability, interest in economics, preference for group work and problem solving efficacy. The problem based approach appeared to be more effective than traditional lecture/discussion, including for students of average verbal ability and below, who were more interested in learning economics, and who were most and least confident in their ability to solve problems. The second study employed two professors who co-taught four sections of microeconomics at a large, urban, public university, while systematically varying how each taught different concepts to different sections. Student pre-post gains on content tests were regressed against demographic characteristics and the amount of problem based instruction the student received. The class sections that had received more of the problem based curriculum posted higher scores, particularly for assessments of certain concepts. Additionally, the instructor who was trained in use of problem based learning had much better results. These findings suggest the importance of aligning the curriculum with assessments and the role of teacher in promoting student understanding. In both studies, teacher taught the same content to different classes using problem based approach and a traditional lecture/discussion. Both sets of results suggest a problem based approach has the potential to improve educational outcomes.

J 18
30 August 2007 17:00 - 18:20
Room: 1.71 Pócza
Paper Session

Learning and instructional technology

Chair: **Andrea Kárpáti,** ELTE University Faculty of Science, *Hungary*

Discovering the potential of video game culture to support learning: Lessons learned from a high school computer programming class
Michael K. Thomas, University of Wisconsin-Madison, *USA*
Xun Ge, University of Oklahoma, *USA*
Barbara Greene, University of Oklahoma, *USA*

This study examined the use game development in a high school computer programming class. High school students created games for elementary school students while obtaining formative feedback from their younger clients. Our experience suggests that in the teaching of computer science in high schools, the development of games that include common game features such as dynamic feedback systems, backstory, levels, cheats, and compelling graphics challenges students and engages them in learning. Incorporating real client feedback is also useful for improving their work and connecting it to the "real" world. This paper continues work that was begun with a high school computer programming class in the spring of 2004. The work in the following year presented many interesting new findings.

The rise of the telecommuter
Heather Kanuka, Athabasca University, *Canada*
Elaine Laflamme, McGill University, *Canada*
Kam Jugdev, Athabasca University, *Canada*
Bob Heller, Athabasca University, *Canada*
Dan West, Athabasca University, *Canada*

A growing number of Higher Education Institutions (HEI) are offering telecommuting options for their academics. As with most opportunities, though, it has tradeoffs. One drawback to telecommuting is that it creates a vulnerable situation for telecommuters, arising from the lack of contact between colleagues and the organization, often resulting in feelings of isolation. However, research has shown these issues can be decreased when there is regular contact and collaboration between and among colleagues, with the most effective contact being activities that revolve around the provision of regular training and continuous support. The purpose of this study was to gather data for further direction on how to provide regular training and continuous learning activities in the area of teaching development to telecommuters. A survey was sent to 609 academic members within our institution. We had 187 responses, for a response rate of 31%. Eighty-five percent of respondents reported a home office as their primary work environment. Through descriptive and factor analyses we were able to identify structures and practices which can be managed skillfully to create an environment that provides regular continuous learning opportunities. The results of this study revealed that such opportunities should focus on: (1) recent hires who have little on-campus teaching experience; (2) sustained early training for all new hires in the area of innovative teaching explorations; (3) individuals with little or no technology experience; (4) creation of workplace community for individuals who provide instruction in distance and online courses; and (5) the provision of opportunities to collaboratively participate in the scholarship of teaching and learning.

The role of argumentation competence and computer literacy as individual learning prerequisites in web-based collaborative inquiry learning
Ingo Kollar, University of Munich, *Germany*
Christof Wecker, University of Munich, *Germany*
Frank Fischer, University of Munich, *Germany*
Carmen Kohnle, Kaufmannische Schule Hechingen, *Germany*
James D. Slotta, University of Toronto, *Canada*

In web-based collaborative inquiry learning, groups of students work on authentic science problems to acquire scientific knowledge by using web-based materials, thereby conducting activities such as hypothesis formation, data interpretation etc. Beyond the acquisition of domain-specific knowledge, core objectives are the acquisition of domain-general competences such as argumentation competence or computer literacy. We empirically investigated whether these competences also play a role as individual learning prerequisites for domain-specific knowledge acquisition. In study 1, 46 students (grades 8-10) from two secondary schools participated. We assessed the individuals' levels of argumentation competence (high vs. low) and established dyads who collaborated on a biology unit from WISE. As expected, learners with high levels of argumentation competence acquired more domain-specific knowledge than learners with low levels of argumentation competence. In study 2, 15 students aged 16-20 participated. We assessed their levels of computer literacy and established dyads who collaborated on a WISE physics unit. In addition to the acquisition of domain-specific knowledge, we were interested in their patterns of media use. The results indicated that learners with lower levels of computer literacy surprisingly

acquired more domain-specific knowledge than learners with higher levels of computer literacy. Analyses of patterns of media use suggested that dyads with high levels of computer literacy focused on actively manipulating media elements for productive use such as notepad windows, but did not elaborate as much upon information that was presented in media elements for receptive use. Learners with low levels of computer literacy distributed their attention to media elements for productive and receptive use more evenly. The results of both studies indicate that domain-general competences such as argumentation competence and computer literacy do not only play a role as important learning objectives, but simultaneously as important learning prerequisites in web-based collaborative inquiry learning.

J 19
30 August 2007 17:00 - 18:20
Room: 0.81 Ortvay
Paper Session

Computer-supported learning environments

Chair: **Zacharias Zacharia,** University of Cyprus, *Cyprus*

Racing academy: A preliminary evaluation of a online racing car simulation game for supporting students learning of engineering
Richard Joiner, University of Bath, *United Kingdom*
Ioanna Iacovides, University of Bath, *United Kingdom*
Jos Darling, University of Bath, *United Kingdom*
Benjamin Drew, University of Bath, *United Kingdom*
Martin Owen, Futurelab, *United Kingdom*
Carl Gavin, Lateral Visions, *United Kingdom*
Stephen Clibbery, Lateral Visions, *United Kingdom*

This paper reports a study which evaluates an online racing car simulation game designed to support undergraduate students learning. A game based learning community was created to support undergraduate students learning of engineering at the University of Bath. One hundred and sixty one students (146 males and 15 females), aged between 18 and 22, average age 18, participated in the study. The results indicated that there was a significant increase in the students' knowledge of engineering. They also felt that Racing Academy was motivating. They found it enjoyable, they felt competent playing the game and they put effort into the game. The analysis of the qualitative data is ongoing and will be focussed on investigating whether the students felt that Racing Academy helped their learning. Preliminary analysis suggests that the students did feel that Racing Academy supported their learning, but that further work is needed to fully embed Racing Academy into the course

In the dialog about the diameter
Mikael Alexandersson, Department of Education, Göteborg University, *Sweden*
Annika Lantz-Andersson, Department of Education, Göteborg University, *Sweden*

The aim of this paper is at analyzing how students negotiate about central concepts and create meaning in a computer-supported learning environment. The research is based on a socio-cultural

perspective on learning (Wertsch, 1991; 1998; Säljß, 2000; 2005). This means that language is regarded as a collective tool for understanding and interacting with the world. Wittgenstein's (1980) concept language game; Bakhtin's (1981; 1974/1986) concept utterances and Goffman's (1959/1974) concepts team and face-work are used as analytical tools. The language is seen as dialogical and the student collective is seen as a team; while they are solving the math problem, their "face" become important in a learning game. The setting is an upper secondary school where students work with educational software and the research questions addressed is: How do students negotiate their understanding of central concepts when they are solving computer supported problems? The results show a negotiation strategy (a language game), in which geometrical concepts and calculations are formed in the interaction by the computer. This strategy is here named conceptual negotiation. In the negotiation not only different intentions, but also different conceptual experiences meet, embedded in a mutual language. Conceptual negotiation can be seen as an expression for students helping each other to turn geometrical concepts over in their minds, in a way that will help them understand the meaning of the concepts through support from each other and through the interaction that the educational software offers. This way they create knowledge in geometry. It is obvious that the digital environment gives another dimension for the students' way of learning mathematical concepts.

The effect of strategic and conceptual scaffolding in graduate students' well-structured and ill-structured problem-solving
Iolie Nicolaidou, Concordia University, *Canada*
Richard Schmid, Concordia University, *Canada*
Christiana Nicolaou, University of Cyprus, *Cyprus*

This study explores the effectiveness of technology-supported scaffolding for problem-solving. It focuses on the effectiveness of strategic and conceptual scaffolding for solving well-structured problems (WSP) and ill-structured problems (ISP), respectively, as well as the effect of prior knowledge. Participants were 45 graduate students enrolled in a Research Methods course at a large Canadian university (2005-06). Their access to online scaffolding was monitored both in and outside class. The effect of strategic scaffolding on well-structured problem solving was minimal. However, there was strong indication that increased use of conceptual scaffolding resulted in learners' better performance in ill-structured problems ($F(1, 39) = 8.44$, p

Design & evaluation of a CSCL activity for the upper elementary grades: Results from a three-year design research project
Ilias Karasavvidis, University of Thessaly, *Greece*

While CSCL has attracted considerable attention over the past few years, research shows that traditional teaching practices cannot be easily translated into CSCL practices. Successful CSCL requires new tasks and activities and there have been calls for the development of such activities. The study reported in this paper aimed at the development and validation of a CSCL activity following a design experiment approach. The present paper focuses on the evaluation results of a design cycle and more particularly on the quality of communication. The study conducted involved three design cycles each of which was realized as a separate, year-long instructional sequence. The author acted both as teacher and researcher for each sequence which spanned over 35 weeks comprising 30 typical 45 minute sessions. 123 5th and 6th graders participated in the first cycle, 89 6th graders in the second cycle, and 136 6th graders in the third cycle. The CSCL activity used in the three cycles involved the technology-mediated, collaborative creation of an electronic newspaper by students from two remote elementary schools. The measures included (a)

length, information value, elaborateness and addressivity of student posts, and (b) student perceptions of the collaborative activity. Results indicated that student communication was characterized by short, cryptic, and difficult to understand messages. Student groups tended to talk past their collaborators rather than to them. The results suggest that the open-ended task used turned out to be a very challenging activity for 6th graders. It is concluded that open-ended tasks require considerable scaffolding to be manageable by elementary students. The paper is concluded with a discussion of the implications of the nature of the task for the design of CSCL activities.

J 20
30 August 2007 17:00 - 18:20
Room: 0.79 Jánossy
Paper Session

Higher education

Chair: **Rainer Bromme,** Universität Münster, *Germany*

The role of course value perception in the persistence of first-year students at university: analysis of determinants and effects.
Gentiane Boudrenghien, Universite catholique de Louvain, *Belgium*
Mariane Frenay, Universite catholique de Louvain, *Belgium*
Sandrine Neuville, Universite catholique de Louvain, *Belgium*
Julia Schmitz, Universite catholique de Louvain, *Belgium*

This study examines, with 405 first-year university students, the role of course value perception in students' persistence intention. Furthermore, it analyses the role of two potential antecedents of value perception: teaching practices and students' goals and regulatory processes through which they pursue their goals. More specifically, types of influence (direct or mediated by value perception) that these antecedents exert on persistence intention are investigated. Results globally support our theoretical model: (1) course value perception directly and positively influences persistence intention; (2) the impact of the students' regulatory process on persistence intention is partially mediated by course value perception; (3) students' regulatory process partially mediates the impact of students' goals content on course value perception and (4) teaching practices' impact on persistence intention is completely mediated by course value perception. Some theoretical and practical implications will be presented.

The role of cognitive abilities, school achievement, and interest congruence for success at university
Gabriel Nagy, Max Planck Institute for Human Development, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Oliver Ludtke, Max Planck Institute for Human Development, *Germany*

Fostering the individual development of abilities and interests is a major goal of school education. Theories about career-related transitions emphasize the importance of these factors for success in new environments, such as university. The present study investigated the role of cognitive abilities, school achievement, and interest congruence for success at university, drawing on a large student sample (N = 1756). Cognitive and school-related abilities were assessed by standardized

tests. School grades were obtained from student files. Vocational interests, the perceived demands of university study, and criterion measures were assessed two years after participants had finished high school. Results revealed that all measures were related to success at university, but to different facets thereof. Cognitive ability and school grades predicted students' achievement, whereas interest congruence was the best predictor of individual satisfaction and drop-out intentions. Additional analyses by field of study revealed that the role of interest congruence was largely invariant across fields; the same held for grades and cognitive abilities. However, subject-specific abilities only appeared to play a role in some fields of study. Implications of these findings for the selection and counseling of university applicants are discussed.

The Missing I(dentity) Principle: The 8th principle of teacher education
Shlomo Back, Kaye Academic College of Education, *Israel*
Judith Barak, Kaye Academic College of Education, *Israel*
Ariela Gidron, Kaye Academic College of Education, *Israel*
Ruth Mansur, Kaye Academic College of Education, *Israel*
Smadar Tuval, Laye Academic College of Education, *Israel*

Recent innovative approaches to teacher education, suggest 7 principles for the structure and processes of Teacher education programs. In this work we would like to add an 8th principle which is the "I"(dentity) principle. The essence of professional identity is a discussed theme in the literature of the last decade. The recognition of the role of identity in constructing professional knowledge and skills calls for reconsideration of the question "what should the teacher be"' in regard to teaching and teacher education. From this point of view we suggest the introduction of the "I" principle, which relates to the personal and professional identity, as a guiding theme within the new spirits of the field. Our presentation provides insights revealed through a teacher education program in which identity is a salient principle. This is an interpretive study that portraits ongoing activities and written assignments in which student teachers' stories of practice are interpreted and identities are negotiated. Through these variant sources we offer a multifaceted picture in regard to the role and the meaning of professional identity, as a fundamental principle within the teacher education program. Being a part of almost all learning experiences within the program, the "I" principle induces a sense of ownership on the chosen ways of action, and a feeling of freedom to decide which way to take.

Managing the shortening of time to completion for doctoral candidates
Margaret Kiley, The Australian National University, *Australia*

This study aims to examine the effect, in three different types of universities, of the Australian Government's Research Training Policy regarding funding on programs and strategies to support research student development and supervision. Publicly available documents and conference presentations are analysed to determine the programs and strategies adopted by those universities in response to the new Government requirements. The study identifies substantial development by universities regarding the support and scaffolding provided to their candidates with the expectation that this support will meet three requirements: . Decreased attrition . Decreased length of candidature . Increased quality of the research education experience The findings suggest that there are ways in which Australian universities can/have developed university-wide support and scaffolding for their research students and these will be reported. Of particular interest are issues that some universities experience in encouraging supervisors to understand the impact of the new system and what it means for the ways they supervise.

J 21
30 August 2007 17:00 - 18:20
Room: 0.100C
Paper Session

Professional development

Chair: **Marold Wosnitza,** Universität Koblenz-Landau, *Germany*

False beliefs in written online tutoring – How do lay misconceptions impact on experts' assessment and adaptation?
Bettina-Maria Becker, University of Münster, *Germany*
Regina Jucks, University of Münster, *Germany*
Rainer Bromme, University of Münster, *Germany*

Tutoring research has identified the recognition and remediation of tutee errors as an important tutorial feature. While ample evidence has shown that error feedback fosters understanding, face-to-face tutors often tutor in a standardized way, ignoring tutees' voiced misconceptions. In this contribution, we report research on the role of misconceptions in written tutoring via email, focusing on the applied setting of online health counselling. The email communicational setting is especially challenging for the medical professionals, because they have to rely entirely on the written lay query as the only source of information on correct and faulty knowledge. In Study 1, we manipulated the layperson's displayed knowledge in a 1x3 design. 83 medical experts answered a tutee's query which either displayed various false or various true lay beliefs or which did not display any beliefs. How do the medical tutors adapt to these indications of lay knowledge? Semantic and linguistic analyses do not show a general adaptation but rather provide evidence of a partial knowledge 'repair' on a local level. In Study 2, 72 medical experts received the query in one of the above described versions and assessed the layperson's knowledge in a 20-item questionnaire. Results show that different levels of knowledge were ascribed to the different query versions with regard to the topics for which the beliefs were manipulated. Beyond that, there were no differences in knowledge assessment. Our results suggest that tutors do not process explicit misconceptions in lay email queries as hints on the systematicity and commonness of false beliefs in lay knowledge. Rather, the misconceptions do only influence the tutors' knowledge assessment and adaptation on a local level. Possible explanations for our findings elaborate on the role of politeness principles in tutoring. Also, implications for medical professional education and for future research will be discussed.

Learning to include - learning to learn
Marietjie Oswald, Stellenbosch University, *South Africa*
Estelle Swart, Stellenbosch University, *South Africa*

This paper presents the learning experiences of a small group of teachers in South African schools as they developed an inclusive school community. The process of transformation to bring the South African education system in line with policy initiatives is a continuous, complex and challenging one for those responsible for implementation. Any transformation or change process is multidimensional, involving changes in conceptions, skills, practice and theory. The purpose of the study was to explore how teachers craft new professional theory and practice when developing inclusive classroom communities. The unit of analysis was therefore those activities and artifacts that indicate and embody teacher learning in practice. Data were collected by means of formal

individual interviews, participant observation and document analysis. The results of this study focused on the school's and teachers' learning experiences which they compared to that of an apprenticeship. For the participants the implementation of inclusive education was a learning process that involved a paradigm shift and was met with initial apprehension. The learning process followed a trial and error approach, without clear guidelines. Uncertainty, apprehension, and feelings of inadequacy were common, yet other aspects such as courage, flexibility and willingness to learn ensured that the learning process continued. The findings further highlighted the importance of support for teachers during processes of change.

Knowledge transformation in the professions: lessons from the domain of management consulting
Josef Strasser, University of Regensburg, *Germany*
Hans Gruber, University of Regensburg, *Germany*

The development of consultants' professional knowledge has rarely been described or thoroughly been analysed. It is therefore unclear what happens to consultants' knowledge base during their career and what kind of knowledge experienced consultants refer to. Research on expertise suggests changes in the structure of practitioners' knowledge as result of professional development. The paper's objective is to explore the validity of these findings for the domain of management consulting. Subjects at three different levels of experience were confronted with an electronically presented case study in which they had to deal with an authentic case in the field of knowledge management in a fictitious semiconductor firm. They were asked to analyse the problem and find attempts for its solution. Think-aloud protocols were gathered. Subjects' statements were analysed as to the different forms of knowledge they applied. Assumptions derived form expertise research mainly could be confirmed. The extent of applied knowledge as well as the kind of knowledge seems to depend on the degree of expertise. For experts, experience-based knowledge which is supported by process-orientated knowledge is the basis of their performance. Obviously, there is a shift from fundamental, theory-based knowledge to more experiential knowledge forms in the development of management consultants. The shift seems to be non gradual and to take place rather early in consultants' professional career. The processes underlying this shift, however, have not yet been addressed. Thus, it is unclear, whether these changes in the knowledge base of consultants can be conceived in terms of existing theories on the development of knowledge structures.

How self-regulated learning fosters the development of teachers' professional potential in special education
Monique Brodeur, University of Quebec in Montreal, *Canada*
Marie-Pier April-Caron, University of Quebec in Montreal, *Canada*
Frederic Legault, University of Quebec in Montreal, *Canada*
Colette Deaudelin, University of Sherbrooke, *Canada*
Valerie Desjardins, University of Quebec in Montreal, *Canada*

This communication presents a research on the trajectories of professional development of teachers for students with visual impairments This research aims to describe and analyze the steps of training of these teachers, using the model of self-regulated learning of Zimmerman (2000). A questionnaire was distributed to the teachers specialized in visual impairments of three School Boards in Quebec. Twenty-eight teachers agreed to take part in this study. From this number, five expert teachers were then selected in order to carry out research interviews. The results showed that the teachers who take in charge their professional development succeed to develop an

expertise about the teaching to the students who present visual impairments. In a general way, these teachers follow a similar trajectory of professional.

J 22
30 August 2007 17:00 - 18:20
Room: 0.100D
Paper Session

Individual differences and cognitive development

Chair: **John Kirby,** Queen's University, *Canada*

Individual and family-related influences on academic effort avoidance after the transition from elementary to secondary school: A developmental perspective.
Brigitte Rollett, University of Vienna, Faculty of Psychology, *Austria*
Harald Werneck, University of Vienna, Faculty of Psychology, *Austria*
Barbara Hanfstingl, University of Klagenfurt, *Austria*

To study the development of academic effort avoidance after transition from elementary to secondary school, we reanalyzed the data of the longitudinal study "Family development In the course of Life" (FIL) originally including 175 families expecting their first, second or third child (five waves, t1: pregnancy, T2: child's age 3 months, t3: 3 years, t4: 8 years, t5: 11 years). To identify developmental trajectories, we conducted two pathanalysis employing Wold's PLS-procedure. Measures: Temperament (t2, scales: positive mood, distress proneness, irritability, rhythmicity, intensity of reaction); parenting style (t4, scales: supportive parenting, strict parenting, accepting parenting) parental partnership (t2, t4 and t5, scale: conflict behavior); intelligence (t4, WISC), disorder specific personality characteristics of the child (t4 and t5, scales: hyperactivity and inattentiveness, opposition and risk taking, dominance, state anxiety, trait anxiety, depressiveness), school grades (German and Mathematics) after transition to secondary school; attachment to parents (t5, scales: trust, communication, negative feelings towards parents, alienation) and academic effort avoidance (t5). Two models to predict effort avoidance at t5 were computed, using parental partnership and personality data at t4 (Model 1) and t5 (Model 2) respectively. Parental conflict had a debilitating influence on attachment quality in both models (paths: .31 and .22). The most important result was the increasing influence of a child's problematic personality characteristics from t4 to t5 and the reduction of the influence of attachment on the emergence of achievement related effort avoidance. This result can be interpreted as an increasing consolidation of negative personality traits paralleled by a lessening of parental influence on student's investment in the attainment of scholastic achievement.

Characteristics of complex learning environments in secondary vocational education as determinants for acquiring the competencies for lifelong learning
Regina H. Mulder, University of Regensburg, *Germany*

Ongoing technological and economic developments lead to the need of lifelong learning for all employees. For lifelong learning specific competencies have to be acquired. Important is that students acquire these before entering the labour market, in vocational education. The central question here is: 'What characteristics of learning environments lead to the development of

competencies for lifelong learning?' Based on ideas of constructivism and situated learning, learning environments are developed, according the principles of Design-Based Research. The basis for these complex learning environments is twofold: the development of students is the central issue, and authentic tasks of the future jobs are part of the training. These learning environments are evaluated, with an experiment-control design, using questionnaires filled out by students (N=107). With T-Tests, correlation and regression analyses the data are analysed. Preliminary results show that motivation is positively influenced by these complex learning environments, and that there is a relation between work identity and characteristics of these learning environments. In this paper the effects of the characteristics of the complex learning environments (called 'job task learning environments') on acquiring competencies will be elaborated on.

Parental attitudes towards academic achievement and academic adjustment in adolescence: Effects of development.
Francisco Peixoto, I. S. P. A., *Portugal*

Research on the relationships between family dynamics and school related variables shows an association between variables associated to parenting (as parental practices, attitudes or involvement in schooling) and school adjustment (academic achievement, academic self-concept or motivation). In the present research we intend: 1) to analyse differences in parental attitudes towards academic performance in function of gender, school grade and socio-cultural background; 2) to identify the relations between adolescent's perceptions of parental attitudes towards academic performance and self-esteem, academic self-concept, achievement motivation and academic performance; 3) to test a model of the mediation of individual variables as motivational orientations and self-concept in the relationship between the perception of parental attitudes towards academic performance and academic achievement. Participants were 756 students attending 7th, 9th and 12th grades. To collect data we used a self-concept scale (Peixoto & Almeida, 1999), a scale of motivational orientations (Skaalvik, 1997) and a scale to assess parental attitudes towards academic performance (Antunes & Fontaine, 2003). Results show main effects of grade and socio-cultural status on the adolescents' perceptions of parental attitudes towards academic performance. Correlation analysis show positive associations between process centered attitudes and academic self-concept, self-esteem, task orientation and academic achievement. Performance centered attitudes are negatively correlated with academic self-concept, self-esteem and academic achievement, and positively correlated with self-enhancing ego orientation and self-defeating ego orientation. Separated correlation analysis by school grade show some differences in the pattern of associations. Path analysis reveals different paths, in the relationship between parental attitudes and academic achievement, for process centered attitudes and for performance centered attitudes. Results will be discussed in terms of possible implications for educational psychology.

Reading activity in French by Croatian young learners – the first results of a longitudinal research
Vanda Marijanovic, Universite de Toulouse - Le Mirail, *France*

The aim of this study is to analyze the reading activity in French (L2) by Croatian children (9-11years) with respect to the development of the phonological awareness across the prism of Baddeley's phonological loop (1992). More precisely, we are interested in low-level mechanisms involved in reading a foreign language in order to explore throughout the productions of children within the "critical age", in which way the different learning strategies may influence the

graphophonological processing, in both native and foreign language. This presentation will focus on our first experiment assessing the pronunciation of nasal and mid vowels, non-existent in Croatian (/y/, /ö/, /ã/, /o/, /?/, /e/, /e/). This experiment was conducted with Croatian beginners in L2 French (A1), yet assumed to be expert readers in L1 Croatian. The main goal was to verify whether Croatian readers, during a reading activity in French - known as an opaque system (Jaffréê, 2003), will apply the grapheme-phoneme correspondence (GPC) rules of their transparent mother tongue (Perfetti, 1989, 1997). The second goal was to observe and to "spot" the specific phenomena of French, assumed to be problematic to Croatian novice readers. From the audio recordings it will be possible to evaluate the pronunciation of each vowel by identifying the characteristic phenomena in relation with L1 Croatian. Thus, we will have more clues about the mental representation of French phonological units that Croatian novices have. In the second time, this study will be followed by another experience with a more didactic objective which will be a comparative study of several strategies of learning to read in French as a Foreign Language. This second experience will permit us to evaluate the different teaching practices and, hopefully, to distinguish the most appropriate practices in order to optimize the teaching/learning of reading in French to Young Learners.

K 1
31 August 2007 08:30 - 10:30
Room: Konferencia
SIG Invited Symposium

The assessment of metacognition.

Chair: **Marcel V. J. Veenman,** University of Amsterdam/ Leiden University, *Netherlands*
Organiser: **Marcel V. J. Veenman,** University of Amsterdam/ Leiden University, *Netherlands*
Discussant: **Christa van Kraayenoord,** The University of Queensland, School of Education, *Australia*

In educational research a serious problem pertains to the disparity amongst definitions of concepts, and, hence, to the lack of congruence in operationalizations of concepts and their assessment methods. This is particularly the case for the field of metacognition, i.e., the knowledge about our cognitive system and the skills for regulating that system. Even as definitions appear to converge to some extent, until recently a proliferation of assessment methods occurred without thorough validation studies. Questionnaires administered either prior to or retrospective to task performance, observations and thinking aloud during task performance, eye-movement or computer-logfile registrations during task performance, and post hoc interviews or video-stimulated recall afterwards, belong to the broad range of assessment tools for metacognition (Veenman, Van Hout-Wolters, & Afflerbach, 2006). All methods suffer from a trade-off between advantages and disadvantages. Some may be easy to administer, but raise doubts about what is actually being measured; others are hard to obtain, but do reflect on-line metacognitive activities during task performance. Quite often, only the internal consistency of metacognition measures (reliability) is reported, rather than the convergent validity with other assessment methods that intend to assess the same construct (Veenman, 2005). Contributions to this symposium will show that multi-method designs are essential for establishing construct validity. Moreover, a second criterion for evaluating assessment methods is their external validity: Do assessment methods of metacognition converge in their prediction of learning performance to the same extent as expected? These validity issues will reoccur during the symposium.

An overview of assessment methods for metacognitive skills: Their internal consistency, concurrent validity, and external validity.
Marcel V. J. Veenman, University of Amsterdam/ Leiden University, *Netherlands*
Bernadette H. A. M. Van Hout-Wolters, University of Amsterdam, *Netherlands*

Metacognitive skillfulness refers to the repertoire of skills and strategies for the regulation of and control over one's learning behavior. Task analysis, activating prior knowledge, planning, monitoring one's activities, evaluating outcomes, and reflecting on one's learning processes are activities representative of metacognitive skillfulness. Moreover, metacognition appears to be one of the most profound predictors of learning outcomes (Wang, Haertel, & Walberg, 1991). In educational research a variety of methods for assessing metacognitive skills, self-regulation, and metacognitive strategy usage is employed. Questionnaires, interviews, systematical observation, protocol analyses, log-file registrations, and stimulated recall are the most frequently used methods. The validity of assessment methods, however, is rarely investigated in a systematical way (Veenman, Van Hout-Wolters, & Afflerbach, 2006). Drawing from the literature, an up-to-date review of the pros and cons of assessment methods will be presented. A distinction will be made between off-line and on-line assessments: Off-line methods are administered either prior or

retrospective to task performance, whereas on-line measures are registered during actual task performance. Apart from the off-line/on-line dimension, assessment methods will be evaluated against three validity criteria: Internal consistency (reliability), concurrent validity by mutual relations with other assessment methods, and external validity for the prediction of learning outcomes. Although we are still in the process of gathering literature data for this review study, some tentative conclusions can be drawn. On-line measures should probably be preferred over off-line-measures, as the latter seem to lack concurrent and external validity. Moreover, there is a need for research using multi-method designs.

Assessing the use of on-line trace methodologies for analyzing the deployment
Roger Azevedo, University of Memphis, Department of Psychology, *USA*
Amy Witherspoon, University of Memphis, Department of Psychology, *USA*
Jeremiah R. Sullins, University of Memphis, Department of Psychology, *USA*
Shanna E. Baker, University of Memphis, Department of Psychology, *USA*

Learning with hypermedia environments involves the deployment of key cognitive and metacognitive self-regulatory processes. A key to assessing these processes during learning involves the use of several on-line trace methodologies such as concurrent think-aloud protocols, log files and video analyses. We have accumulated an extensive knowledge base from laboratory and classroom studies examining the role of adolescents' and college students' self-regulated learning with hypermedia-based environments (see Azevedo, 2005). Our current understanding of the dynamic and recursive nature of use of these processes during learning is somewhat limited by the capabilities of current technological tools which are augmented by the use of multiple converging on-line trace methodologies. In this presentation, we will assess the conceptual, methodological, and empirical issues related to using on-line trace methods to assess learners' understanding about complex science topics (e.g., circulatory system) with hypermedia. Conceptually, we will (1) present results illustrating the advantages and disadvantages to using on-line trace methodologies in collecting cognitive and other non-cognitive processes during learning; (2) describe current limitations in the use of log file analyses to examine self-regulatory processes; and, (3) argue for the integration of other self-report measures to augment our theoretical understanding of the complex nature of self-regulatory processes. Methodologically, we will discuss ways in which current learning technologies and cognitive methodologies can be combined with computational and other advances in computer science and AI to collect, detect, trace, and model learners' self-regulatory processes during learning. Empirically, we will discuss our existing approaches to converging process and product and assess its advantages and disadvantages.

Assessing metacognitive activities: Is using a questionnaire a valid way?
Gonny L. M. Schellings, Graduate School of Teaching and Learning, UvA, *Netherlands*
Bernadette H. A. M. Van Hout-Wolters, University of Amsterdam, *Netherlands*
Marcel V. J. Veenman, University of Amsterdam/ Leiden University, *Netherlands*
Joost Meijer, SCO Kohnstamm Institute, Univ. of Amsterdam, *Netherlands*

Educational research has yielded a diversity of assessment instruments for assessing learning strategies, each with their strengths and methodological flaws (Van Hout-Wolters, 2006). Administering questionnaires, for example, is least effortful. One may question, however, whether participants are able to 'say what they will do, or recollect accurately what they have done'. Veenman (2005) concluded that research concerning the convergent-validity of questionnaires is lacking. Hence, there is a need for validity research with multi-method designs, which must be executed meticulously, meaning that different methods should assess the same metacognitive activities (van Hout-Wolters, 2006). In the present study, we examine whether a task-specific retrospective questionnaire assessing metacognitive activities yields similar results as assessing metacognitive activities concurrently with the think-aloud method. The questionnaire was straightforwardly constructed parallel to a hierarchical taxonomy developed in a preceding think-aloud study (Meijer, Veenman, & Van Hout-Wolters, 2006). Data from the questionnaire and the think-aloud method are compared in a within-subjects multi-method design. Sixteen students in secondary education (ninth grade) study a history text while thinking aloud. Immediately after studying the text, the students are presented with a metacognitive questionnaire, consisting of 58 items. Finally, a learning posttest is administered. Thinking-aloud protocols will be coded according to the Meijer et al. metacognitive taxonomy. Analyses will be performed on the level of specific metacognitive activities, as well as on super-ordinate categories of metacognitive skills (orientation, planning, execution, monitoring, evaluation, and reflection). At present, the data are being gathered and results will be available in due time.

Metacognition and strategy use in the college classroom
Gregory Schraw, University of Nevada, Las Vegas, *USA*
John Nietfeld, North Carolina State University, *USA*
Li Cao, West Georgia University, *USA*
Lori Olafson, University of Nevada, Las Vegas, *USA*

We investigated whether a self-report instrument of metacognitive knowledge was related to measures of mental ability, motivation, and strategy use during a college course on learning, and performance on exams. 60 undergraduates completed the 52-item Metacognitive Awareness Inventory (MAI) (Schraw & Dennison, 1994), the Ravens Progressive Matrices, the Hope Scale, a strategy use inventory, and completed a final exam. The MAI yielded two reliable factors (i.e., knowledge of cognition, regulation of cognition) that explained 75% of sample variance. The knowledge of regulation factor was correlated positively with strategy use and the Hope Scale, but was uncorrelated with the Ravens test and final exam. These findings suggested the MAI has good construct validity, but poor predictive validity when used to predict a single final exam among college students. Future studies should examine the relationship between the MAI and more complex measures of learning.

K 2
31 August 2007 08:30 - 10:30
Room: Harmónia

SIG Invited Symposium

Social and psychological perspectives on inclusion: some research findings

Chair: **Roger Säljö,** Göteborg University, *Sweden*
Organiser: **Eva Hjörne,** Göteborg University, *Sweden*
Organiser: **Geerdina van der Aalsvoort,** Leiden University, *Netherlands*
Discussant: **Hugh Mehan,** University of California, *USA*

The purpose of this symposium is to address issues of how diversity is understood, and accommodated to in educational settings. A comprehensive school implies that the variation in the population with respect to social background, cultural origin, language, perceived learning ability and so on, will be visible in most classrooms. The explicit ambition of inclusion and having 'a school for all' signals an expectation that it is possible to organize teaching and learning in the classroom in manners that make it possible for all students to profit from the activities. However, research findings reveal an alarming result of an increasing number of pupils who find it difficult to reach the goals in school. This has resulted in increased demands for different compensatory solutions with for example placement in special schools, in special teaching groups, or in some other special educational setting as a consequence. The intention of having a school for all, when transformed into practice, results in fundamental dilemmas about inclusion and exclusion of children with different kinds of abilities and backgrounds. Segregating solutions will not only have consequences for the idea of a having a school for all but, equally importantly, it will also have a decisive influence on children's identity, learning and development. How educational institutions deal with diversity is one of the most important determinants of learning and development, but one which has received relatively little attention. In this symposium, the theme is explored with a focus on analysing how inclusion and potentials of learning are understood and dealt with in schools. The contributors relate their research findings to these issues and focus on the educational strategies practitioners consider relevant when organizing teaching and learning practices for children considered to be in need of special support.

'Self" and 'other' imposed withdrawing in social interactions at school: experiences of Portugese students in British schools
Guida de Abreu, Oxford Brookes University, *United Kingdom*
Hannah Lambert, Cambridge University, *United Kingdom*

The process of migration involves the transition from being a full-member of communities of practice in the home country to being a novice or peripheral-participant in the host country. To adapt successfully migrants have to engage in social interactions with members of the new communities. For young people social interactions with their new peers and teachers are of fundamental importance. This presentation examines Portuguese students' accounts regarding their experiences in adjusting to schooling in England to explore how different patterns of participation are constructed. Drawing on data from a project conducted between 2000 and 2003 with Portuguese students in British schools (England and Jersey) a range of situations where the students reported withdrawing from a particular form of participation (interaction) in their school are examined. Most students did not speak English when they arrived at their English school. In addition, life in the English school exposed the students to others' constructions of their identities, often in ways they felt disruptive to their sense of self. Both types of experiences were associated

with withdrawing from social interactions. Initially, having a limited understanding of the English language was recounted as resulting in "self-imposed withdrawing", usually temporarily, until the student developed English for social communication. In contrast, disruptions to the self, such as experiences of discrimination, are better accounted in terms of "other-imposed withdrawing", and were described as having long term impact in cultural adjustment and associated trajectories. The possible connections between these two forms of withdrawing and Wenger's distinction between "marginalities of competence" and "marginalities of experience" will be discussed. Withdrawing from social interactions that are crucial to their development in British schools is a manifestation of students' agency, but also a manifestation of schooling practices that do not make it easier for them to incorporate their past histories.

Social interaction dynamics in supporting learning of students with special needs
Marja Vauras, University of Turku, *Finland*
Pekka Salonen, University of Turku, *Finland*
Riita Kinnunen, University of Turku, *Finland*

The aim of this presentation is to discuss the demands for learning environments in instructing struggling learners and to highlight the 'social' in instructional practise. In line with current research, our studies have shown that some students show strong resistance to instruction. Long-term, stabilised motivational and emotional vulnerability as well as social and self-regulatory incompetence severely interfere with students' ability to benefit from instruction. There is still a need for deeper analyses of transactional instruction and student scaffolding, both in inclusive and special needs education. Our recent studies with learning disadvantaged (LD) students, empirically confirmed the earlier conclusions about how the training of cognitive strategies, construction of metacognition, restructuring of socio-emotional coping, motivational strategies, and social competence must be co-ordinated with respect to promoting self-regulation and transfer of training. It is argued that LD students need carefully designed, flexible and adaptive support environments to dismantle their maladaptive beliefs and interpretations, to strengthen their academic and social competence, and to bridge the wide competence gap between themselves and their peers. This demand has ever more put the social interaction in a spotlight in understanding the power of instruction and the design of learning environments. Surprisingly little, though, is known of the interpersonal patterns or group dynamics shaping the participants' transactions in learning settings, and recurrent interaction patterns, which may prove highly favourable or damaging in scaffolding LD students – or highly damaging. Gradually, these interactions build up distinct developmental trajectories as well as socio-cognitive and motivational-emotional developmental paths and outcomes. Better understanding of transaction and group processes in actual learning may importantly help us to design sensitive, flexible, responsive and adaptive learning and support environments for LD students. The research striving to fulfil this goal faces severe methodological challenges, both in research design and in analysis.

Taking account of learner diversity: some lessons from research
Mel Ainscow, Manchester University, *United Kingdom*

This paper will report on some aspects of a collaborative action research project involving teams from 25 schools in England working with researchers in an attempt to understand how schools can develop more inclusive ways of working. A common process of development emerged across the schools, which started with the disturbance of existing practices and was nurtured by a range of institutional and external factors that included ideas about inclusion. The research revealed how, as a result of engaging with various forms of evidence, staff within some schools reconsidered their assumptions and, as a result, were able to develop new ways of working. In some cases this led to significant changes in the way problems were defined and addressed. We saw these as examples of the way norms of teaching are socially negotiated within the everyday context of the schools. In this sense, they are evidence of how the culture of the workplace impacts upon how teachers see their work and, indeed, their students. This means that the development of more inclusive approaches does not arise from a mechanical process in which any one specific organizational restructuring, or the introduction of a particular set of techniques, generates increased levels of participation. Rather, it requires processes of social learning within specific contexts. The national 'standards agenda' was a major force shaping the directions taken by the schools. Whilst it constrained inclusive development it also provided that development with a particular focus and led schools to consider issues that might otherwise have been overlooked. The paper will conclude that inclusive developments - albeit of a highly ambiguous nature - are possible even in apparently unpromising circumstances and that there may be specific ways in which these developments can be supported.

Developing learning potentials in an AD/HD-classroom
Eva Hjörne, Göteborg University, *Sweden*

The focus in this presentation concerns what happens when children are placed in a special teaching group, that is, in an AD/HD-group. What kind of education is offered to the children? The research is ethnographic and based on participant observation, fieldnotes, document analysis and tape-recorded interviews within an ADHD-class. The issues explored in the study concern what pedagogical strategies, ways of communicating and organizing the school day, methods for examining learning and so on, are established in this context and how are the identities of the children shaped through the practices? The analyses indicate that the pedagogical arrangements considered suitable for the children classified in these manners consist of extremely well structured lessons where the form rather than the content become the main issue. The expressed goal is to normalise the child to be able to participate in a regular class at a later point. One of the key ambitions of the practices observed is that the pupils should be made aware of their identity as being deviant and of their belonging to the category 'AD/HD-pupil'. The pupils should also learn to monitor their own behaviours and to filter what they do through their knowledge of what it implies to be an AD/HD-pupil, i.e. they are trained in mastering their handicap. In some sense, they are learning how to be disabled in a normal setting.

K 3
31 August 2007 08:30 - 10:30
Room: 0.83 Eötvös
SIG Invited Symposium

Research on Teaching and Teacher Education; gaps and possibilities for European research

Chair: **Elaine Munthe,** University of Stavanger, *Norway*
Organiser: **Elaine Munthe,** University of Stavanger, *Norway*
Discussant: **Elaine Munthe,** University of Stavanger, *Norway*

SIG11 on Teaching and Teacher Education will devote its Invited Symposium to discussing some research gaps in European research and will invite participants to join in on a discussion of what research is needed for the future development of European research on teaching and teacher education and how SIG11 can contribute to this. The papers presented cover different areas; Harm Tillema, the Netherlands, questions research methodology concerned with studies of teachers' reflection and how for instance researchers' choices and deliberations in designing a study can ameliorate critical subjectivity while analyzing and interpreting accounts of teaching. Michal Zellermayer, Israel, approaches the question of research from a teacher education standpoint. She will analyze the new scholarship in teacher education colleges during the last decade and will show that, rather than competing with the universities in research on teacher education, they have developed research for teacher education with immediate implications for curriculum and teaching. Katrin Hjort, Denmark, addresses relations between the more traditional professional knowledge of the teachers and the new types of knowledge about teaching required at the moment are in focus. Types of knowledge and politics of knowledge will be a main concern, and what kind of research is needed to develop knowledge on supporting teachers' professional practice. Kirsti Klette, Norway, has professional repertoires in classrooms as a departure point. She will discuss research gaps revealed throughout classroom studies in the Nordic countries, the poor link, engagement and conversation between knowledge gained within the research field of education and its practical dissemination and use. Finally, she will address the need to develop more operational, technical and instrumental tools that could support and contribute to research based teaching and learning.

"Working in the interpretive zone": researcher's construction of knowledge in studies of teaching.
Harm Tillema, University of Leiden, *Netherlands*

In doing research on teaching one has to acknowledge the ways in which researchers' intentions interact with the process of study, and how they serve to shape research outcomes. Such a recognition calls for attention to working in the interpretive zone (Wasser & Bressler, 1996). Based on our own studies on teachers' reflective expertise (Mena Marcos & Tillema, 2006; Tillema & Orland Barak, 2006) it is exemplified how articulation of researchers' choice and deliberation in designing a study could ameliorate critical subjectivity while analyzing and interpreting accounts of teaching and clarify interactions between researcher and teacher. By contrasting researchers' intentions and subsequent interpretations of data or 'findings' a conceptual figure is created to illustrate the need for clarity on researchers' construction of knowledge in studies on teaching. One study will be used as a case, and the findings of this study are elucidated against the conceptual figure which comprises four pitfalls of working in the

interpretive zone. This analysis will lead to a demand for further clarification of research findings as well as an improved conception of the study's design. This case analysis is taken to derive certain criteria or strongholds that could orient researchers in the design of their studies. Based on a review of studies of reflection (Mena Marcos & Tillema, 2006) our search has further substantiated criteria of appraising research on teaching that refer to a) selection of instruments, b) analysis and coverage of data, and c) integration of findings. Finally, although there is no 'should' in 'research' (only 'search'), some guidelines are offered to construct future research designs.

The new scholarship in teacher education in Israel
Michal Zellermayer, Levinsky College of Education, *Israel*

There are two paths for teacher preparation in Israel: 1. Two-year postgraduate Teaching Certificate university programs for candidates holding BA degrees in one of the high school disciplines. 2. A four year undergraduate teacher education program in teacher colleges preparing early childhood to 10th grade teachers. The majority (85%) of teachers are educated in 28 colleges around the country. Until the nineties, the universities took the lead in producing research in this field and the teacher colleges did not develop a culture of research on teacher education. In a survey of research on teacher education in Israel of that period (Ben-Peretz, 1990), there is no reference to studies initiated and conducted by the teacher-colleges faculty members. In the early nineties, when teacher education colleges in Europe and in the US were closed or integrated in universities, an academization process supported by The Commission for Higher Education began (Ariav, 1993), which strengthened the status of the colleges, and encouraged their faculty members to engage in research. This presentation will analyze the new scholarship in teacher education colleges during the last decade and will show that, rather than competing with the universities in research on teacher education, they have developed research for teacher education with immediate implications for curriculum and teaching.

Types of knowledge - politics of knowledge
Katrin Hjort, Danish University of Education, *Denmark*

The upper secondary school in Denmark is undergoing a great reform as a part of the general modernisation or transformation process of the Scandinavian Welfare States. The reform represents important new challenges to the teachers, including demands to produce new types of knowledge in order to document their activities and the outcome of their work. Teaching has to be more transparent and open to external evaluations and accountancy. This paper takes its point of departure in a present research project financed by the Danish States Research Council and explores – inspired by Michel Foucault's concept of Power/Knowledge – the relations between the more traditional professional knowledge of the teachers and the new types of knowledge about teaching required at the moment. The paper analyse the competition between the different types of knowledge as representing power relations or power struggles between different politics of knowledge and discuss the possibility of developing knowledge able to support the teachers professional practice.

Professional repertoires in classrooms
Kirsti Klette, University of Oslo, *Norway*

The aim of this paper is to discuss research gaps in teaching and teacher education from the point of view of studies of professional repertoires in classrooms. Despite massive research within the field of education trying to grasp the relation between the who, the how and the what at the

classroom level, our disciplinary area still suffers from a lack of an analytical and methodological framework that integrates the three elements as well as the relation between them. Studies of teachers and teaching have been poorly aligned with studies of students' operational learning and vice versa and we know little about to what extent - and how - differences in teachers' activities are related to students' learning. Few studies of teachers and teaching have examined the extent to which differences in teacher effectiveness are related to differences in teachers' subject matter knowledge. Two decades after Shulman and his colleagues' prominent research program on pedagogic content knowledge as a special amalgam of content and pedagogy essential to teachers' professional understanding we still tend to discuss teaching and learning in general terms separated from the content coverage involved. In my contribution I will link knowledge challenges in teaching and teacher education to: i) current research gaps revealed throughout classroom studies in the Nordic countries ii) the poor link, engagement and conversation between knowledge gained within the research field of education and it's practical dissemination and use at the operational classroom level, and iii) the need to develop more operational, technical and instrumental tools that could support and contribute to research based teaching and learning

K 4
31 August 2007 08:30 - 10:30
Room: -1.63
Symposium

Learning through dialogue and collaboration: new findings and conceptualizations

Chair: **Ed Elbers,** Utrecht University, *Netherlands*
Organiser: **Ed Elbers,** Utrecht University, *Netherlands*
Discussant: **Karen Littleton,** Open University, *United Kingdom*

Learning through dialogue and collaboration is an important issue in educational studies. However, transforming educational practice from more traditional, transmission based classroom instruction to teaching and learning through dialogue and collaborative group work has proved not easy. Establishing and sustaining collaboration and dialogues in classrooms demands different attitudes and new skills for both teachers and students. As we will demonstrate in this symposium, it also demands the establishment of specific ground rules. This symposium brings together recent international research on collaborative and dialogic learning and teaching. The papers report on new findings and will provide new insights in both educational practice and theory. The papers also show a diversity of applications of dialogic and collaborative principles: online knowledge building, multi-ethnic classrooms, the teaching and learning of science and literacy learning. The paper of Judith Kleine Staarman and Neil Mercer introduces a dialogic approach to teaching and learning. Based on previous and current research on student group work and classroom interaction, these authors propose ground rules for teachers and students to establish and sustain constructive classroom dialogue. Sylvia Rojas-Drummond and her colleagues compare the use of talk in two very different collaborative task settings. They found that working together in open ended tasks induces students to use different types of talk than in closed tasks. Linda Biro and her colleagues report on the introduction of a programme for improving collaborative reasoning in multi-ethnic classrooms. These authors created a specific intervention to adapt to the challenges of a class population with diverse cultural and language backgrounds. Eva Vass and her colleagues make

visible that collaboration processes show cognitive, social and affective dimensions which cannot be separated because they are integral to the process of collaborative knowledge building. The symposium will end with a discussion of the papers led by Karen Littleton.

From exploratory talk to exploratory teaching talk. The dynamics of teaching through dialogue.
Judith Kleine Staarman, University of Cambridge, *United Kingdom*
Neil Mercer, University of Cambridge, *United Kingdom*

This paper describes research on dialogue between teachers and students in primary and secondary classrooms. A central concept for our investigation is 'dialogic teaching', which, using the recent comparative, cross-cultural research of Alexander as a basis, has been strongly identified with effective classroom teaching. A second key concept is 'Exploratory Talk', a form of reasoned discussion which our own research has shown is associated with successful problem solving in small groups. In the current paper, we bring these two concepts together in an analysis of the strategies that teachers can use to engage students in constructive dialogues related to the teaching and learning of science. The research provides new insights into the discursive processes of teaching and learning in science classrooms and how teachers can use dialogue to support student learning more effectively. Using qualitative and quantitative methods we have identified 'Exploratory Teaching Talk' as a specific kind of whole class dialogue within various possible teaching strategies that form part of a dialogic pedagogy. As with Exploratory Talk, Exploratory Teaching Talk aims to open up a dialogic space in which people are expected to participate, ideas are compared, mistakes are allowed and agreement and shared understanding is sought. We argue that the teacher and the students need to establish ground rules for this kind of dialogue to become possible because the normative basis for this type of whole-class interaction is fundamentally different from more common and well-established transmissive and authoritative styles of interaction.

The generality versus specificity of using exploratory talk in different tasks.
Sylvia Rojas-Drummond, National Autonomous Univerity of Mexico, *Mexico*
Nancy Mazon, National Autonomous Univerity of Mexico, *Mexico*
Guadalupe Vega, National Autonomous Univerity of Mexico, *Mexico*
Maricela Velez, National Autonomous Univerity of Mexico, *Mexico*

In this paper we will compare the talk used by 6th grade children (11 to 12 years old) in two different tasks. In both tasks children worked in triads. The children studied in a state primary school in Mexico City and came from a poor socioeconomic background. They participated in an innovative educational program called "Learning Together". This programme strives to form a learning community with the participation of the children, their teachers, the administration authorities and University researchers. The first task administered to the children was a closed task – an adaptation of the Ravens Test of Progressive Matrices created by R. Wegerif. In this type of task there is only one correct answer to the problem. In contrast, the second task is an open one where there is not one correct solution. In particular, the task is a psycholinguistic problem where children have to read three texts of different linguistic genres. One is a note from an Encyclopaedia, the second one is a news report and the third one corresponds to an interview. All texts are genuine and talk about the same topic. Children had to read the three texts and write a summary integrating them. Results will be reported comparing the use of the talk by the children in the close versus the open task.

The intertwining of cognitive, social and affective dimensions of shared knowledge building in online collaboration.
Eva Vass, University of Otago, *New Zealand*
F. Concannon, University of Otago, *New Zealand*
Martin LeVoi, Open University, *United Kingdom*
Karen Littleton, Open University, *United Kingdom*
Dorothy Miell, Open University, *United Kingdom*

This paper discusses methodological considerations in research on computer-based collaboration. The study reported in the paper builds on socio-cultural theorising, and explored processes of asynchronous online learning through the analysis of online discourse. Two distance-learning courses – at the Open University, UK, and the University of Otago, NZ – served as the basis for the analysis. Drawing on these two data sets, the study examined the relationship between the cognitive, social and affective aspects of online group work, and the role of these dimensions in shared knowledge building. The analysis involved the message-level documentation of the cyclical process of online practical inquiry, assigning messages to different phases – trigger, exploration, synthesis and solution – within each cycle (Garrison & Anderson, 2003). This was combined with the exploration of cognitive, social and affective dimensions within each message and at each phase. To aid the analytic process through visual mapping, a conference activity graph (Hara, Bonk and Angeli, 2000) of each cycle was drawn. The paper challenges existing conceptualisations of online discourse which foreground the cognitive dimension of computer-mediated interactions. It suggests that cognitive processes involved in shared knowledge building are inextricably interwoven with the development of a collaborative community of enquiry. It is also shown that the affective and cognitive dimensions of online presence are closely linked, and contributions with affective content can be integral to the process of practical inquiry. In sum, we argue that all three dimensions of online presence are essential for building a supportive and well-organised community and engaging in shared knowledge building.

Teaching reasoning skills in multi-ethnic classrooms.
Linda Biro, Utrecht University, *Netherlands*
Ed Elbers, Utrecht University, *Netherlands*
Mariëtte de Haan, Utrecht University, *Netherlands*

Previous studies on reasoning skills in multi-ethnic classrooms have shown that migrant children are less successful in schools than native children who speak the school language at home. In order to support students' reasoning skills we introduced an adapted version of the Thinking Together Program of Dawes, Mercer & Wegerif (2000) in a Dutch multi-ethnic classroom. Because our aim was to introduce the program in a classroom with children with various language and cultural backgrounds, we adapted the program to the educational needs of the population in the classroom. We did so by expanding the program with activities to enhance students' meta-linguistic and communicative skills. We set up a pilot project in a Dutch multi-ethnic classroom. The program consisted of 12 lessons and ran from the beginning of November 2006 until the end of March 2007. During the lessons the students always worked together in small groups of three students. We video-recorded the students collaborative activities in the small groups. For comparing the students' reasoning skills in the small groups before and after the intervention, we also used a pre- and post-test. In our contribution we will present analyses of our video-data. We will focus on the metalinguistic and intercultural communicative skills which we have fostered in the program. In relationship to the adapted program we will also discuss the improvement of the reasoning skills of

the students in the small groups. Preliminary results show that students' awareness of communicative arrangements is raised, and that students express their ideas in different ways.

K 5
31 August 2007 08:30 - 10:30
Room: -1.62
Symposium

Instructional approaches and affordances of representations in multimedia learning environments

Chair: **Tessa Eysink,** University of Twente, *Netherlands*
Organiser: **Tessa Eysink,** University of Twente, *Netherlands*
Discussant: **Marcia Linn,** University of California, Berkeley, *USA*

In this symposium, findings of the Dutch/German NSF research programme LEMMA (Learning Environments, MultiMedia and Affordances) are presented. The main goal of this research programme is to gain insight on how representational codes influence learning processes and learning results. The ultimate objective of the programme is to produce a coherent framework of design rules and guidelines for the use of (multiple) representations in multimedia learning environments. From a theoretical perspective, the programme combines theories of 'computational effectiveness' (Larkin & Simon, 1987; Stenning & Oberlander, 1995), 'dual coding' (Päivio, 1990), 'cognitive load' (Sweller, 1999), and 'multimedia design' (Ainsworth, 1999). In this symposium, a set of experimental studies on the effectiveness of different types of representations (pictorial, arithmetical, and textual, and their combinations) on learning processes and learning outcomes is presented. Four instructional approaches will be addressed: inquiry learning, observational learning, hypermedia learning, and example based learning. All approaches have used the same domain of probability theory, the same set of performance tests, and the same cognitive load measures for reasons of comparison. This comparison across instructional approaches will be presented in the final presentation. Ainsworth, S.E., (1999) A functional taxonomy of multiple representations. Computers and Education, 33(2/3), 131-152. Larkin, J.H., & Simon, H.A. (1987). Why a diagram is (sometimes) worth ten thousand words. Cognitive Science, 11, 65-99. Päivio, A. (1990). Mental representations: A dual coding approach. New York: Oxford University Press. Stenning, K., & Oberlander, J. (1995). A cognitive theory of graphical and linguistic reasoning: Logic and implementation. Cognitive Science, 19, 97-140 Sweller, J. (1999). Instructional design in technical areas. Camberwell: ACER Press.

The influence of representational format on learner-generated domain representations and mathematical understanding
Bas Kolloffel, University of Twente, *Netherlands*
Tessa Eysink, University of Twente, *Netherlands*
Ton de Jong, University of Twente, *Netherlands*

Meaningful learning cannot be attained by processing subject matter only superficially. It requires a deeper level of processing, whereby the learner integrates new information into new or existing cognitive structures. In some domains, for example mathematics, it is notoriously difficult for learners to gain conceptual understanding. A way to foster meaningful learning and understanding

is having learners externalize their knowledge (e.g. by creating concept maps, summaries, building models, etc.). In the case of probability, a sub-domain of mathematics, it has been found that in the process of externalizing knowledge, learners tend to use self-invented representations (ranging from textual statements to conventional numerical representations to hybrid forms) rather than standard notations, because self-invented representations apparently are more meaningful to the learner. The aim of the current study was to determine (1) whether the expression of knowledge facilitates the construction of mathematical knowledge in probability instruction, and (2) whether the format (graphical, mathematical, or textual) in which the learners express their knowledge affects learning outcomes. It was found that the expression of knowledge by learners is related to enhanced levels of situational knowledge and overall knowledge. Second, the format in which the learners express their knowledge does not influence either the quality of the domain representations or the learning outcomes. However, the format does affect the perceived affordances of the representational format (graphical, mathematical, or textual). In case of a graphical or textual format, about half of the learners were able to create a domain representation, whereas in the case of a mathematical format, less than 20% of the learners were able to create a domain representation.

How to optimize learning from animated expert models?
Pieter Wouters, Open University of the Netherlands, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*
Jeroen van Merriënboer, Open University of the Netherlands, *Netherlands*

In three studies we investigated how learning from animated expert models in the domain of probability calculation can be optimized. In animated expert models an expert solves a problem and explains how and why this is done in this particular way. Cognitive load theory contends that these models should be designed in such a way that learners prevent ineffective cognitive load and engage in relevant learning activities that impose effective cognitive load. Study 1 investigated guidelines to reduce ineffective cognitive load and revealed that learner-paced spoken continuous animated models led to better near transfer performance than spoken segmented animated models, whereas with written explanatory text learner-paced continuous animated models led to better far transfer performance than segmented animated models. Study 2 and 3 investigated guidelines that have learners engage in relevant learning activities. In Study 2 we argued that reflection prompts would stimulate learners to be cognitively active and integrate new information with their prior knowledge. The results showed that reflection prompts were effective with written explanatory texts, but not with spoken explanatory texts. Study 3 investigated whether alternating between observing models and practicing would ameliorate learning. We argued that observing and practicing yield different ways of processing information and that alternating between these two instructional techniques would yield enriched schemas. Data of this study will be available in February 2007. In the presentation the theoretical (e.g., what does this mean for the modality effect) and practical implications of these studies will be discussed.

Supporting navigational and representational choices in hypermedia learning environments
Maria Opfermann, Knowledge Media Research Center, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*
Katharina Scheiter, University of Tübingen, *Germany*

When learning with hypermedia environments, learners are provided with a high degree of learner control, which, if used in an appropriate way, enables them to learn in an active, constructive, self-regulated and adaptive way. However, our own prior studies showed that learners do not

automatically display beneficial learning strategies when provided with a high amount of learner control. The current study therefore investigates (a) which navigational and representational choices prove to be beneficial for learning and (b) whether self-regulated learning and appropriate choices can be fostered by providing learners with different forms of instructional support. We are using a 2*2 design varying the factors metacognitive support (yes / no) and representational prompting (yes / no). Participants are German high school students. The learning environment they work with aims at conveying basic principles of probability theory by means of worked-out examples. Participants can retrieve these examples in a purely mathematical format or enriched with written text, spoken text, animations or any combination of these representational formats. We hypothesize that students who receive metacognitive support and representational prompts will be better able to (a) select representational formats that are beneficial for their learning outcomes and (b) to adapt and change learning strategies according to their prerequisites and needs. This, in turn, should lead to better performance scores compared to participants who do not receive such support. The study is currently being conducted and final results are expected within the end of January.

Multiple representations and two instructional support procedures foster conceptual knowledge, but not procedural knowledge

Kirsten Bertold, University of Freiburg, *Germany*
Rolf Schwonke, University of Freiburg, *Germany*
Alexander Renkl, University of Freiburg, *Germany*

Multiple representations in learning materials provide unique benefits when learners are to gain a deep understanding. However, they often do not lead to the ex®pected results, especially because the learners do not integrate the different representations. Due to such problems, it seems wise to instructionally support the integration and understanding of multiple representations. In the present experiment, we employed worked-out examples and tested the effects of multi- vs. mono-representational solutions, an integration aid in form of a flashing-colour-coding procedure, and scaffolding self-explanation prompts (‘fill-in-the-blank‘ explanations; cf. Figure 1) on learning processes (i.e., self-explanations) and learning outcomes (i.e., conceptual and procedural knowledge). 170 school students learned about probability theory under four mono-representa®tional and four multi-representational conditions: (1) ‘Pictorial/ no prompts‘, (2) ‘pictorial/ prompts‘, (3) ‘arithmetical/ no prompts‘, (4) ‘arithmetical/ prompts‘, (5) ‘pictorial and arithmetical/ no prompts/ no integration aid‘, (6) ‘pictorial and arithmetical/ prompts/ no integration aid‘, (7) ‘pictorial and arithmetical/ no prompts/ integration aid‘, (8) ‘pictorial and arithmetical/ prompts/ integration aid.’ Planned contrasts showed that multi-representational solutions and an integration aid fostered conceptual knowledge but did not influence the acquisition of procedural knowledge. Furthermore, scaffolding self-explanation prompts elicited rationale-based self-explanations (i.e., giving reasons why the principle is as it is) and principle-based explanations (i.e., assigning meaning to a solution step by identifying the underlying domain principles) and thereby also fostered conceptual knowledge (scaffolding self-explanation effect). However, they also evoked incorrect explanations (e.g., misconcepts, confusion of two principles, etc.) that impaired the acquisition of procedural knowledge (paradox self-explanation prompt effect). Evidently, multi-representational solutions and corresponding instructional procedures differ in their advantage for learning specific knowledge types. Thus, it is only for certain learning goals that learners should master the demanding task of translating between two representations.

Instructional approaches and affordances of representations
Tessa Eysink, University of Twente, *Netherlands*
Ton de Jong, University of Twente, *Netherlands*

In this study, the influence of instructional approach on learning outcomes has been investigated. Many studies often use a single instructional approach which is claimed to lead to good learning results. However, the question which instructional approach leads to the best results is rarely addressed. In this paper we will answer this question by comparing four instructional approaches: (a) inquiry learning, (b) observational learning, (c) hypermedia learning, and (d) example based learning. Besides instructional approach, representational code has been taken into account. In the learning environments, single and multiple representations were used. Results were taken from the experiments of the projects in the LEMMA (Learning Environments, MultiMedia and Affordances) cooperation. To ensure that the four projects could be compared, common elements were developed. This resulted in all projects using the same concepts in the domain of probability theory, the same pre- and posttests measuring conceptual, procedural, intuitive and situational knowledge, and the same cognitive load measures. Results show that instructional approach influences all types of knowledge. For conceptual knowledge, example based learning outperformed all other instructional approaches, and inquiry learning scored significantly higher than observational learning. For procedural knowledge, again example based learning scored higher than the other three instructional approaches. And this time, inquiry learning outperformed hypermedia learning. For intuitive and situational knowledge, example based learning scored significantly higher than observational learning as well as hypermedia learning. The analyses show that in this comparison example based learning is the best instructional approach followed by inquiry learning. In the symposium, we will discuss these results and their theoretical implications. Furthermore, within instructional approaches differences were found between representational codes. However, in the comparisons across instructional approaches, the type of instructional approach appeared to be of more influence than the representational code.

K 6
31 August 2007 08:30 - 10:30
Room: -1.64
Symposium

Assessing epistemological beliefs

Chair: **Jan Elen,** K.U.Leuven, *Belgium*
Organiser: **Jan Elen,** K.U.Leuven, *Belgium*
Organiser: **Geraldine Clarebout,** K.U.Leuven, *Belgium*
Discussant: **Margarita Limon,** Universidad autonoma de Madrid, *Spain*

Epistemological beliefs have received a lot of attention in educational research. It is assumed that studens' epistemological beliefs are related to their problem solving skills (Hofer, 2001). A widely used instrument to measure epistemological beliefs is Schommer's questionnaire. Despite the broad use of the instrument, conceptual and methodological issues about the instrument have been raised (see for instance, Clarebout, Elen, Luyten, & Bamps, 2001). From various perspectives, therefore, researchers have been looking for alternative approaches to assess epistemological beliefs. Four contributions each present a different instrument for measuring epistemological

beliefs. In this symposium the advantages and disadvantages of these alternative approaches are discussed.

CAEB: Possibilities and limits of a semantic differential to measure epistemological beliefs
Elmar Stahl, University of Education, *Germany*
Rainer Bromme, University of Münster, *Germany*

We present an overview of nine studies on different applications of CAEB, a semantic differential to measure epistemological beliefs. The aim of the overview is to examine the quality of the instrument in different empirical contexts. CAEB (connotative aspects of epistemological beliefs) is a semantic differential to examine students' associative-evaluative beliefs about the nature of knowledge in different domains. In CAEB students read an initial sentence like "knowledge in botanic can be described as:" and are asked to judge their beliefs about knowledge (thus in this case about botanic) on 24 pairs of adjectives (like: dynamic – static; structured – unstructured). CAEB allows to establish judgement-profiles on item level as well as to calculate factor scores of the participants. Criteria to judge the quality of CAEB were: a) replication of the factor structure, b) ability to measure differences in students' beliefs about different academic domains, c) relations to other variables in the learning process. We were able to replicate a stable two factor solution with the dimensions texture (beliefs about structure and accuracy of knowledge) and variability (beliefs about stability and dynamic of knowledge) in all studies. CAEB proved to be able to measure differences of students' epistemological beliefs for different academic domains in three studies. Further on, we found interactions between students' epistemological beliefs measured with CAEB and different variables of learning processes within six studies. Up to now we can conclude that our studies with CAEB are promising. These results will be discussed in relation to the possibilities and limits of CAEB to measure epistemological beliefs.

Epistemic reasoning versus epistemic beliefs: on the distinction between procedural and declarative levels of personal epistemology
Cornelis de Brabander, Leiden University, *Netherlands*
Jeroen Rozendaal, University of Leiden, *Netherlands*

We proposed a distinction between a procedural and a declarative level of personal epistemology, designated as epistemic reasoning respectively epistemic beliefs. We hypothesized that epistemic beliefs are developed later than epistemic reasoning and tested this hypothesis in two studies with the assumption that internal consistency within and relations between measures of epistemic reasoning and measures of epistemic beliefs are higher depending of the developmental level of the underlying constructs. Epistemic reasoning was measured using bipolar scales containing explicit contrasting labels. Respondents judged two domains: knowledge on nature and knowledge on man and society. In each domain one scale was established: uncertainty of knowledge within each domain. Epistemic reasoning was measured using knowledge dilemmas and asking the respondent to indicate level of agreement with statements that represent different ways of epistemic reasoning. Three scales were derived: absolutism, multiplism, and evaluativism. In the first study 209 respondents participated. Internal consistency of uncertainty of knowledge scales appeared to increase with five consecutive grade levels, starting with secondary third grade. Internal consistencies of absolutism were more equal, however an increase was detectable in the consistency of multiplism and evaluativism. Patterns of correlations between and among measures of epistemic reasoning and epistemic beliefs were variable and difficult to interpret. In the second study the number of grade levels was decreased to three (secondary fourth, sixth, and bachelor students) in favor of the number of respondents. In total 330 respondents participated. Analysis is

still in progress, but internal consistencies both of uncertainty measures and of epistemic reasoning measures were more or less equal.

Content-rich and content-free measures of epistemological understanding
Michael Weinstock, Ben-Gurion University of the Negev, *Israel*

In order to assess people's underlying approach to the nature of knowledge claims, epistemological instruments have generally been designed to be more or less content-free so that responses will not be influenced by prior opinions or knowledge. Although this approach is justified if one wants to assess how people make sense of how people approach unfamiliar knowledge domains or understand how discrepant knowledge claims arise, it may test a small subset of everyday knowing. It would seem that most knowledge claims that people would truly consider in a normal day concern areas that they would care about or have at least some prior knowledge. This presentation will examine the use of a content-free instrument, explore findings that indicate that prior subject or cultural knowledge might influence responses, and present variations on the instrument that might better demonstrate how content might influence responses to assessment items. The implications are twofold: (1) People's epistemological "competence," as measured by content-free measures may not accurately indicate their performance when having to consider knowledge claims relevant to their own experience, and (2) more attention should be paid to designing assessments that can tap epistemological understandings while not obscuring the influence of people's everyday, domain specific, and cultural knowledge.

The use of drawings to assess students' epistemological beliefs
Geraldine Clarebout, K.U.Leuven, *Belgium*
Fien Depaepe, K.U.Leuven, *Belgium*
Jan Elen, K.U.Leuven, *Belgium*
Jeremy Briell, K.U.Leuven, *Belgium*

Various instruments have been used to assess epistemological beliefs. In this contribution the use of drawings will be discussed. 216 educational science students were asked to draw 'knowledge'. A categorisation system for the nature of knowledge resulted from a bottom-up sorting process in which three researchers participated. The use of the system by two independent researchers presents an indication of its viability. This categorisation reveals four groups, namely knowledge as 1) being part of the person, 2) being part of the external world, 3) being part of both the person and the external world or 4) being a process. The largest group, 37.96%, sees knowledge as something personal, followed by 35.12% who sees knowledge as personal and external. Only 11.11% of the students see knowledge as something purely external; and 12.5% as a process.

K 7
31 August 2007 08:30 - 10:30
Room: 2.54 Novobátzky
Symposium

Computers in science education: Fostering scientific inquiry learning

Chair: **Joerg Zumbach,** University of Salzburg, *Austria*
Chair: **Peter Reimann,** University of Sydney, *Australia*
Organiser: **Joerg Zumbach,** University of Salzburg, *Austria*
Discussant: **Heinz Mandl,** University of Munich, *Germany*

Acquiring basic scientific competences and literacy is one of the primary goals of contemporary science classrooms. Scientific competences and literacy include cognitive as well as meta-cognitive knowledge and the ability to apply this knowledge within a scientific context. To be scientifically literate and competent requires learners to collect information and data about specific concepts, schemata or domains. In addition, scientific literacy requires the ability to recognize and develop scientific questions, to draw conclusions from theoretical considerations and empirical findings. Fostering scientific learning, especially inquiry-based science education, is itself a complex and highly demanding domain. Here, computer-based learning environments in general and computer-based simulations in particular are able to enrich traditional classrooms by providing for authenticity and for "hands-on" experiences even in areas where schools cannot be expected to provide the respective "real" environment for learning. Within this symposium, several approaches to fostering scientific inquiry learning by means of computer-supported learning environments are addressed. Two papers in this symposium contribute to support knowledge building within the area of dynamic systems. The contribution by Thompson and Reimann examines learning processes and outcomes of learning complex environmental systems with a system dynamics approach and an agent-based approach. Unterbruner, Pfligersdorffer and Zumbach present the design and evaluation of a blended learning environment for understanding complex ecological systems. Two other papers address issues of scaffolding scientific inquiry learning. Kßrndle and Narciss suggest a computer-based approach to support interactive argumentation tasks by means of an ontology describing a prototypic inquiry cycle. Wichmann and Harrer emphasize the role of student generated explanations during inquiry-based learning and present the design and evaluation of a scripting-approach. Finally, Zumbach, Schmitt, Starkloff, Sarti and Reimann present a simulation-based approach to support life science education.

Patterns of using system dynamics models and agent based models to understand a complex environmental system – a comparison
Kate Thompson, University of Sydney, *Australia*
Peter Reimann, University of Sydney, *Australia*

In this research, we have compared the use of two types of simulation models as a way for school students to learn about a complex environmental system. In an experimental setting, year 10 students were given either a system dynamics model (SDM), an agent based model (ABM). Analysis of the screen captures taken from a selection of the computers in the pilot study revealed distinct differences in the way that the models were interrogated. By analysing this data in terms of the framework outlined in Levy & Wilensky (2005) we were able to classify our students' strategies and suggest additional observations that will allow us to further classify patterns and

strategies. This rich source of data may help to explain some of the differences in learning outcomes found in the study.

Investigating nature in class: natureLe@rn – an e-learning environment for the science classroom
Ulrike Unterbruner, University of Salzburg, *Austria*
Georg Pfligersdorffer, University of Salzburg, *Austria*
Joerg Zumbach, University of Salzburg, *Austria*

The project natureLe@rn has been developed to foster understanding of contemporary, modern ecology. The basic distribution of this learning environment is provided by the learning platform moodle. The content of the learning environment addressed here mainly eight graders on the basis of the national Austrian biology curriculum and incorporates contemporary ecological know-how on ecosystems as patchdynamics. The major rationales for the instructional design of the learning environment were elements from Problem-Based Learning and Practice-Based Learning. Overall, eight modules were developed and extensively evaluated in cooperation with twelve Austrian high schools and lead to compromising results with regards to knowledge acquisition, maintenance and fostering of interests and acceptance of the learning platform. Further results address teachers' attitudes towards the learning environment, usage patterns as well as the change of teachers' roles from an instructor to a consultant role by implementing the natureLe@rn approach into the classroom.

How to foster inquiry-based science learning through computer-based interactive argumentation tasks
Hermann Koerndle, Technische Universität Dresden, *Germany*
Susanne Narciss, Technische Universität Dresden, *Germany*

Inquiry learning (Bruner, 1961; Dewey, 1938) is considered to be a powerful approach of science teaching because it may offer authentic experiences with scientific activities such as question posing, theorizing and argumentation. With the development of computer-simulations, inquiry-based science learning became more feasible. Successful inquiry learning requires students to construct hypothesis on the basis of their theoretical models, test them in systematic way and derive conclusions from their testing results. Yet, students were found to have serious difficulties in accomplishing these requirements (e.g., de Jong & van Joolingen, 1998; Lßhner, van Joolingen, Savelsbergh & Hout-Wolters, 2005). Hence, the purposes of this paper are (a) to describe how computer-based interactive argumentation tasks can be developed on the basis of a normative description of the steps of the so-called inquiry cycle (e.g. Lßhner et al., 2005; White & Shamoda (1999), and (b) to investigate how the developed argumentation tasks contribute to scientific skill acquisition – namely scientific argumentation on the basis of systematically formulating and evaluating hypotheses.

Adaptation of explanation-based inquiry scripts using IMS/LD
Astrid Wichmann, University of Duisburg-Essen, *Germany*
Andreas Harrer, University of Duisburg-Essen, *Germany*

We will present the functionality of explanation-based inquiry scripts and initial findings of an experiment series investigating the potential of adaptive IMS Learning Design scripts (Koper & Tattersall, 2005). The study explores the benefits of specific explanation support during a cycle of inquiry within the model-based environment Freestyler/Cool Modes. When students take part in scientific inquiry activities there seems to be evidence that explanation building is beneficial for

learning. However in order to engage students in explanation building students need encouragement (Atkinson, Renkl, Merrill, 2003). Explanation-based inquiry scripts can provide this support by prompting students during specific phases of the inquiry process. In previous studies we found that during an adapted inquiry cycle, the "Reflective Prediction Cycle" (Wichmann et. al, 2005), students wrote elaborated explanations especially after stating a hypothesis, during conclusions and before formulating a follow-up research question. The students' explanations included various metacognitive statements depending on the quality of explanations. For example anticipatory thinking appeared mostly in combination with elaborated, complex explanations. Based on these findings we developed explanation-based inquiry scripts that specifically promote using metacognitive strategies and making inferences. This study relies on an experimental design with two experimental groups using explanation-based inquiry scripts and a control group using an inquiry script only. The first experimental group uses a macro script that supports explanation building in general. The second experimental group uses a micro script that specifically aims at promoting metacognitive strategies and inference making during stages of inquiry. We analyze students' explanations via content analysis and measure learning outcomes using a pre-post assessment. Findings give insights regarding the benefits of specific support during explanation-based inquiry activities. Results will contribute to support explanation building by implementing IMS/LD scripts.

Life Science competences: A top-down standards approach for inquiry learning
Joerg Zumbach, University of Salzburg, *Austria*
Stefanie Schmitt, University of Heidelberg, *Germany*
Philipp Starkloff, SAP AG, *Germany*
Julia Sarti, University of Koblenz-Landau, *Germany*
Peter Reimann, University of Sydney, *Australia*

The life sciences have become a pivotal area of research and innovation, and at the same time are amongst the most controversially discussed in today's society. Despite this discussion, the demand for life science expertise increases rapidly, creating a growing need for life science education in particular and for science education in general. Progress in this area depends on progress in biology, chemistry, computer science, and some others. In this contribution, we present a top-down approach to science education that suggests guided knowledge acquisition in combination with hands-on experience. Thus, we developed a competence-standard model that incorporates objectives and methods to meet standard objectives as well. The approach has been operationalised by means of a computer-based learning environment for learning life sciences within the area of molecular biology. The evaluations of the main features, including a virtual experimental workbench, various scaffolding tools, among them a pedagogical agent, and a report/presentation tool, are reported. Findings emphasize several advantages of the suggested model. Students profited equally form working with the learning environment, independent of differences in prior knowledge and interest.

K 8
31 August 2007 08:30 - 10:30
Room: 7.14
Symposium

Fading instructional support with learners' growing competence

Chair: **Alexander Renkl,** University of Freiburg, *Germany*
Organiser: **Alexander Renkl,** University of Freiburg, *Germany*
Organiser: **Frank Fischer,** University of Munich, *Germany*
Discussant: **John Sweller,** University of New South Wales, *Australia*

A rather well-established research finding is that learners with poor learning prerequisites (e.g., low prior knowledge) benefit from instructional arrangements that provide substantial support whereas learners with favourable prerequisites (e.g., high prior knowledge) are better off with lower degrees of support. This research finding has been widely acknowledged for many years. However, not until a few years ago, approaches have been developed that can guide the design of learning environments according to this research finding: In the beginning of the learning process, that is, when prior knowledge is low, much instructional support is provided; with growing competence, this support is faded out. In this symposium we will present and discuss recent empirical work related to instructional approaches that are based on a fading rationale. Thereby, two main goals will be pursued: First, we want to show that fading instructional support is a general instructional design principle that applies to such different learning methods as example-based learning (van Gog et al.), inquiry learning (Krajcik & McNeill), collaborative learning (Wecker & Fischer), and tutorial learning (Renkl et al). Second, as researchers from different "camps" are brought together, there is an opportunity to accumulate scientific knowledge on how to effectively implement the fading principle in different contexts and types of learning environments.

Sequencing process-oriented and product-oriented worked examples
Tamara van Gog, Open University of The Netherlands, *Netherlands*
Fred Paas, Open University of The Netherlands, *Netherlands*
Jeroen van Merriënboer, Open University of The Netherlands, *Netherlands*

Research has shown that for novice learners, studying worked examples is more effective in terms of learning and transfer performance than conventional problem solving. Recently, it was proposed that the effectiveness of worked examples could be increased by not only showing the solution steps as in traditional worked examples (i.e., product-oriented), but also explaining the rationale behind those steps (i.e., process-oriented). This hypothesis was recently investigated in the domain of computer-simulated electrical circuits troubleshooting. The results showed that studying process-oriented worked examples required more investment of mental effort during the training and the transfer test, but did not result in better transfer performance than studying product-oriented worked examples. The combination of equal performance with more investment of effort to attain that performance, suggests lower efficiency, that is, lower quality of learning. Hence, the present study investigated whether this might be due to a 'redundancy effect': the added process information might become redundant and start to hamper learning when training progresses. This was indeed found to be the case. Process-oriented worked examples resulted in higher efficiency after a first short training. When the second short training consisted also of process-oriented worked examples, efficiency dropped radically, whereas when it consisted of product-oriented

examples, efficiency continued to increase. These results suggest that process information should initially be offered in worked examples and then faded in order to enhance learning.

Fading process-related support: The role of distributed monitoring for the acquisition of cognitive skills
Christof Wecker, University of Munich, *Germany*
Frank Fischer, University of Munich, *Germany*

Forms of process-related support developed to foster the acquisition of knowledge and skills, such as scripts, exonerate learners from the responsibility for the control of their performance, thereby cutting down opportunities to practice an important component of cognitive skills. The fading of scripts gradually opens the room for learners to take over control, but still does not ensure that learners acquire the necessary knowledge before the script components disappear. Distributed monitoring of the adherence to the steps of the script, such as feedback by a learning partner, may help learners to internalize the strategy contained in the script. In this study we tested the assumption that only the combination of fading and additional support such as distributed monitoring fosters the acquisition of declarative and procedural knowledge underlying a cognitive skill such as producing counterarguments in online discussions. In an experimental 2x2 design with the factors fading and distributed monitoring, 120 students of education wrote critical replies to theory-based analyses of cases from educational practice on an online discussion board with support by a script, and answered post-tests on declarative and procedural knowledge underlying the cognitive skill to produce counterarguments. The results support the hypothesis that only the combination of fading and distributed monitoring rather than these factors alone foster the acquisition of declarative knowledge underlying the skill, while the corresponding hypothesis concerning procedural knowledge receives no support by our data. On a more general level, the results indicate that collaboration can be used to support the transition from guided practice to self-directed performance of skills.

Faded worked-out examples in an intelligent tutoring system: Do they further improve learning?
Alexander Renkl, University of Freiburg, *Germany*
Rolf Schwonke, University of Freiburg, *Germany*
Joerg Wittwer, University of Freiburg, *Germany*
Carmen Krieg, University of Freiburg, *Germany*
Vinvent Aleven, Carnegie Mellon University, *USA*
Ron Salden, Carnegie Mellon University, *USA*

Many studies have shown that learning from worked-out examples is more effective and efficient in initial cognitive skill acquisition than learning by problem solving (worked-example effect). As worked-out examples lose their positive effects when the learners' competence increases, it is especially effective to employ faded worked-out examples (i.e., first fully worked-out examples, then incompletely worked-out examples, and finally problems to-be-solved). Recently, the generality of the worked-example effect has been challenged. Some authors (e.g., McLaren, Lim, Gagnon, Yaron, & Koedinger, 2006; Koedinger & Aleven, in press) argued that there is no additional benefit of worked-out examples in compared to well-supported problem solving, as implemented, for example, in intelligent tutoring systems such as Cognitive Tutors. In order to test this objection, we conducted two experiments in which we compared two versions of a Cognitive Tutor. A standard version presented only problems to-be-solved. A faded-example version included worked-out steps that were gradually removed. In both versions, we supported the learners by self-explanation prompts. In both experiments, we had German high-school students

learn geometry. In Experiment 1 (n = 50), we did not find significant differences in the effectiveness of the two tutor versions. However, the faded-example version was more efficient (i.e., less learning time). Process analyses revealed that students had substantial problems in appropriately using the faded-example tutor. In Experiment 2 (n = 30), we, therefore, provided students with additional instructions on how to use the tutor. Results showed that students acquired deeper conceptual understanding when they worked with the faded-example tutor as compared to the standard tutor. In addition, they needed less learning time. Hence, we showed that there is actually an additional benefit of learning from faded examples even when compared to well-supported learning by problem solving.

K 9
31 August 2007 08:30 - 10:30
Room: 4.95
Symposium

Learning to reason in institutional contexts

Chair: **Åsa Mäkitalo,** Department of Education, Göteborg university, *Sweden*
Organiser: **Åsa Mäkitalo,** Department of Education, Göteborg university, *Sweden*
Discussant: **Sten Ludvigsen,** Intermedia, University of Oslo, *Norway*

Within sociocultural perspectives, learning is situated at the intersection of collective and individual action. Learning to reason in institutional contexts, thus means learning how to make sense according to specific institutionalised forms of discourse. In analyses of learning and reasoning in institutional settings, the researcher has to be able to account for the relation between the stable features of institutional context while yet maintaining the integrity of interactional phenomena. In other words, the analyst needs to combine analyses of the 'interactional order' with those of the 'institutional order'. Analytically notions such as, for instance, participants' framing of activites, specific speech genres and institutional categorisations all draw attention to the contextual and cultural features of such institutional forms of discourse. This symposium draws attention to the question of what it implies to learn how to reason in institutionally relevant ways and how we analytically may address such issues. Today, institutional actors (such as teachers, social workers, psychologists and others) to an increasing extent work across institutional settings, which imply their tasks may be framed in several ways. This stresses learning in terms of how to reason in everyday work as they define problems, take on conflicting demands and make decisions. The papers in this symposium illuminate how institutional actors address their tasks as delicate, value laden and consequential. Learning how to reason include such concerns and thus incorporates how to anticipate consequences and responses from stakeholders within as well as outside the institution. The contributions all in different ways highlight the notion of institutional accountability in their studies of reasoning in such contexts.

Resisting Relational Agency: shoring up the professional boundaries of schooling
Anne Edwards, Dep. of Educational Studies, University of Oxford, *United Kingdom*

The evidence to be discussed in this paper is drawn from a four year study of the learning challenges involved when professionals such as social workers, teachers and psychologists learn collaborate across their professional boundaries in order to work with vulnerable children and

young people and prevent their social exclusion. The particular focus is a school which is located within a city which is reconfiguring the professional practices of people who work with vulnerable children. Using frameworks and processes derived from activity theory we have examined the social practices, and positions taken with in them, in both the school and the services which are reconfiguring around it. In this paper we examine how the way that the school categorises pupils unsurprisingly sustains the historical purposes of schooling in England with an emphasis on social control. Particular attention is paid to how these categories are currently also used to strengthen the boundaries between the school and other services at a time when these boundaries are under pressure from external agencies who want new forms of relational collaboration.

Error, blame and responsibility in child welfare: Problematics of governance in an invisible trade
Susan White, Human & Health Sciences, Univ. of Huddersfield, *United Kingdom*
Chris Hall, Human & Health Sciences, Univ. of Huddersfield, *United Kingdom*
Sue Peckover, Human & Health Sciences, Univ. of Huddersfield, *United Kingdom*
Andy Pithouse, Social Sciences, Cardiff University, *United Kingdom*
David Wastell, Nottingham University Business School, *United Kingdom*

This paper presents preliminary findings from a study examining the impact of the anticipation of 'error' or 'blame' on the everyday work of professionals in child welfare services in the UK, particularly those involving the protection/safeguarding of children at risk. We know that child welfare professionals have to negotiate complex decision-making activities for which they feel and are held accountable. These can be decisions about risk for example, or may be about resource allocations, or aspects of performance management. Different managerial levels may be more, or less affected by these different accountabilities, but they create an extremely complex set of tasks, which are generally poorly understood and over-simplified in both media and policy debates. In this study, we explore how practitioners and managers learn about and cope with these, often competing, demands. The study involves 2 phases: 1. Ethnography (in various sites over a six month period) 2. Micro-world simulations based on the ethnography and customised to each organisational setting. These are derived from cognitive ergonomics where for many years computer simulations of complex decision tasks have been used to analyse judgement-making where people are making complex decisions, having regard to range of often competing demands, in conditions of uncertainty. These ideas are starting to be used to understand medical decision-making. We apply these to child welfare seeking to understand the ways in which people invoke various moral and administrative accountabilities in their attempts to balance risk and resources.

Reliability and trust in psychological examinations: learning through practice
Michele Grossen, Department of Psychology, University of Lausanne, *Switzerland*
Stephanie Lauvergeon, Department of Psychology, University of Lausanne, *Switzerland*
Douchka Florez, Department of Psychology, University of Lausanne, *Switzerland*

Considering that psychological examination is a social and institutional activity, we propose to study the situated use of tests through the lens of socio-cultural psychology and other related strands. Within this framework, we carried out a study in which 17 psychologists from three psychological services for children and adolescents were interviewed about their use of tests in psychological examination. Our aim was to document the reported practices which practitioners held to be relevant in order to perform a reliable psychological assessment. We shall focus upon a topic which recurrently appeared in the psychologists' discourse: test reliability. In fact, the psychologists repetitively expressed their concern for the conditions which make the test results reliable and enable them to fully assume the responsibility of their assessment and to appear as

accountable professionals. On a methodological level, we identified all the sequences which dealt with the topic of test reliability and submitted them to both a thematic and discursive analysis. The analysis focused on the context in which this theme appeared and on the way in which it was put into words and topicalised. The results showed that, in the psychologists' discourse, reliability is a broader notion than in the test designers' discourse. Firstly, it included many concrete elements of the situation and of the clients' characteristics which were not mentioned by test designers. Therefore, it can be considered to result from a process of learning through practice. Secondly, reliability was associated with the notion of trust. In fact, in the psychologists' discourse, evaluating whether the results of a test are reliable or not was based upon the psychologist's personal involvement and judgement, and gained a moral dimension. We shall show that by reinterpreting the notion of reliability in terms of trust, the psychologists managed to present themselves as competent and accountable professionals.

What is left unsaid. A study of moral accountability in vocational guidance activities.
Åsa Mäkitalo, Department of Education, Göteborg University, *Sweden*

To become legitimate knowers in institutional settings, participants must learn their accounting practices, i.e. the authoritative ways of making sense of events, of knowing how to frame tasks and how to act. Certain ways of categorizing and reasoning accompany institutional activities and function as cues and justifications for normative actions in them. Learning to reason in institutional contexts, thus, means learning how to make sense according to specific institutionalised forms of discourse . Professional and bureaucratic categories dominate the discourses of institutional settings. Professionals are trained to take a "neutral" stance as institutional representatives; they are expected to attend to their tasks as "de-moralized" issues according to some theory, model, or bureaucratic ideal of efficiency. But while the overtly moral dimensions seem to have disappeared in professional jargon and official documents, studies of daily activities in present-day institutions reveal that the kind of decision making institutional actors are engaged in rests on assessments and decisions about people's normality and moral accountability. In this study I address how we as analysts may illuminate what it implies to act accountably as a client in a specific institutional setting where such matters are only alluded to or hinted at. A combination of approaches is suggested to explore implicit accounts as intrinsic to institutional activities. The paper more specifically reports on an analysis of moral accountability in 30 audio-recorded vocational guidance conversations at a public employment office in Sweden. Participants managed moral accountability by normalizing a person's conduct, preempting potential critique and marking transgression. Clients were never held accountable for lack of competence, knowledge, or skill or for failing to get a job. A critical element in sustaining oneself as a morally accountable client in this setting is to successfully display one's efforts properly in situ as well as through the institutional record.

K 10
31 August 2007 08:30 - 10:30
Room: 0.100A
Symposium

The development of children's reasoning on linear and non-linear situations

Chair: **Dirk De Bock,** European University College Brussels, *Belgium*
Organiser: **Dirk De Bock,** European University College Brussels, *Belgium*
Organiser: **Wim Van Dooren,** Catholic University of Leuven, *Belgium*
Organiser: **Lieven Verschaffel,** Catholic University of Leuven, *Belgium*
Discussant: **Peter Bryant,** University of Oxford, *United Kingdom*

Since many years, research has demonstrated children's difficulties to reason linearly (or proportionally), both from a technical and conceptual point of view. At the same time, recent studies in different countries show that children also tend to over-use the linear model, i.e. they start applying linear/proportional strategies also in non-linear situations. This symposium brings together research findings on the development of students' reasoning in linear and non-linear situations, and more specifically on their tendency to over-use linearity. The studies include students from various ages (from 5-year olds to adults) and pertain to a variety of mathematical domains. By confronting these different lines of research – each encountering the over-use of linear methods in a particular way –, we will not only show the university and diversity of this phenomenon, but also gain a deeper understanding of the psychological and educational processes involved. Ebersbach et al. found that even 5-year-old preschoolers already discriminate between linear and non-linear growth processes in inductive reasoning. Nevertheless, they still underestimate non-linear growth in a too linear fashion. Van Dooren et al. focus on the solution of word problems by 9-12-year-olds. They convincingly show that the number structure of a missing-value problem strongly affects students' tendency to (improperly) apply linear methods. Modestou et al. further develop the knowledge on improper linear reasoning in geometrical problem solving concerning area and volume in 14-15-year-olds. These reasearchers found a weaker impact of the linear model on 15-year old students' reasoning compared to that of younger students. Finally, Hadjidemetriou et al. investigated the over-use of linearity in graphical contexts by 15-year-olds and their teachers. They provided strong evidence for the existence of a 'Linear Prototype' in students, and even in some teachers.

Little, more, non-linear: How the concept of non-linearity develops
Mirjam Ebersbach, Leiden University, *Netherlands*
Wilma C M Resing, Leiden University, *Netherlands*

Many phenomena in everyday life may be conceived of as either linear or non-linear processes: Whereas the total price of chocolate bars is usually a linear function of the total number of chocolate bars one buys, the thickness of a folded paper increases non-linearly with the number of folds. The present study investigated whether 5-year-olds (N=54) are able to differentiate between both types of processes. Children forecasted linear and quadratic growth in an inductive reasoning task, in which the information amount initially provided, was systematically varied. As a result, the majority of children assumed a rule-based process even if only minimal information was given. Furthermore, they discriminated between linear and quadratic growth by estimating the first one

correctly with lower magnitudes than the latter one. Nevertheless, the curve of their estimations exhibited for both linear and quadratic growth a linear shape. Combining these finding with those of earlier research in this domain, it might be hypothesized that the concept of non-linearity develops in several phases. First, no differentiation between linear and non-linear processes will take place. Thereafter, estimations of non-linear processes will become higher than those of linear processes but, nevertheless, will continue exhibiting a linear shape. Later, these estimations will show a non-linear shape, but only a part of the true exponent of the underlying non-linear function is taken into account. Finally, non-linear processes will be estimated with the appropriate magnitudes. However, it was shown that even adolescents and adults achieve this last phase only with simple tasks, whereas in a variety of other tasks this sample grossly underestimated non-linear processes. The development of the concept of non-linearity will be discussed also with regard to people's ability to estimate linear processes.

Pupils' over-use of proportionality on missing-value problems: How numbers may change solutions

Wim Van Dooren, Catholic University of Leuven, *Belgium*
Dirk De Bock, European University College Brussels, *Belgium*
Lieven Verschaffel, Catholic University of Leuven, *Belgium*

Previous research showed that primary school pupils over-use proportional methods especially when solving non-proportional missing-value word problems®. The current study examines whether the numbers appearing in these word problems partly explain this phenomenon. In most previous studies, the numbers in the problems formed integer ratios (i.e., the outcome could be obtained by making an integer multiplicative jump). This may have stimulated pupils to use proportional methods, also in cases where these are inappropriate. A test containing proportional and non-proportional word problems was given to 508 4th to 6th graders. Numbers in these problems were experimentally manipulated so that the ratios were sometimes integer and sometimes not. For example, a non-proportional problem with integer ratios was: Ellen and Kim are running around a track. They run equally fast, but Ellen started later. When Ellen has run 16 laps, Kim has run 32 laps. When Ellen has run 48 laps, how many has Kim run? while the version with non-integer ratios was Ellen and Kim are running around a track. They run equally fast, but Ellen started later. When Ellen has run 16 laps, Kim has run 24 laps. When Ellen has run 36 laps, how many has Kim run? Correct (additive) reasoning is comparably easy for both versions, but proportional reasoning is far less evident (though still possible, of course) for the version with non-integer ratios. As expected, problems with integer ratios elicited much more (inappropriate) proportional methods in pupils than non-integer ratios. This effect was particularly strong in 4th grade, dropped in 5th grade to disappear in 6th grade. Theoretical, methodological, and practical implications of these findings are discussed.

The illusion of linearity in geometrical problem solving

Modestina Modestou, University of Cyprus, *Cyprus*
Iliada Elia, University of Cyprus, *Cyprus*
Athanasios Gagatsis, University of Cyprus, *Cyprus*
Giorgos Spanoudes, University of Cyprus, *Cyprus*

This study explores the different dimensions of students' abilities in geometrical problem solving concerning area and volume, with special emphasis on students' behaviour while handling pseudo-proportional problems and on alteration of this behaviour with students' age. Students in 9th and 10th gradewere given a test involving three types of problems: usual computation problems,

pseudo-proportional problems and impossible ones. The examined grades were deliberately chosen because they belong to two different educational levels in Cyprus with different approaches in the teaching of geometry. Confirmatory Factor Analysis was used for the analysis of the data in order to explore the structural organization of the various dimensions of geometrical problem solving in each age group. This statistical technique was employed as the application of other analyses (MANOVA) did not show a variation in students' mean performance in pseudo-proportional tasks, with respect to grade level. Therefore, a more comprehensive analysis was necessary to further illuminate the phenomenon of pseudo-proportionality, based on the conjunctions of students' handling the pseudo-proportional problems and the problems of different reasoning requirements on the same content. Results suggest the existence of two different structural models - one for each age group - for the interpretation of students' geometrical problem solving behaviour. The students of both grades did not approach the three types of problems in the same way but used different reasoning processes. For the younger students the pseudo-proportional problems were of a similar nature as the usual problems and therefore, composed a common factor. On the other hand, the pseudo-proportional problems formed a factor of their own in the case of the older students, making obvious a different reasoning approach compared to the usual ones. This is indicative of the weaker impact of the linear model on 15-year old students' reasoning compared to younger students' thinking.

The linearity prototype in pupils' and teachers' perspectives on graphs
Constantia Hadjidemetriou, Intercollege, *Cyprus*
Julian Williams, University of Manchester, *United Kingdom*

This paper describes pupils' and teachers' performance on a task designed to diagnose the Linearity Prototype (LP). The 'Charity' item required pupils to draw a graph showing that after a Charity event 'The more people help, the sooner we finish tidying up'. The whole test, consisting of 29 items, was administered to 425 pupils and their 12 teachers. Results showed 80% of 14-15-year olds exhibiting the LP in the Charity item with no significant differences among year 9 and 10 pupils. Pupils' responses were confirmed and enriched through group interviews in order to analyse the thinking process behind their inappropriate linear reasoning. 18 pupils were interviewed. The results indicated some mismatch between pupils' reasoning and their graphs with the linearity answer being 'conceptually' but not 'realistically' correct for some of them. Pupils' responses also confirmed that, under test conditions, they answer questions superficially without engaging in deep mental processes, and that they fall into the 'linearity trap' because they inappropriately apply the methods they used to draw linear graphs to unsuitable situations. The teachers were asked to rate the difficulty of these items on a five-point scale, answer the questions and predict possible difficulties of their pupils. Teachers' ratings were analysed using the Inverse Partial Credit Model. Teacher's difficulty estimates were compared to pupils' actual difficulty estimates and discrepancies were detected. Although teachers accurately predicted pupils' difficulty in most of the items of the test, their prediction for this particular item was significantly underestimated. Semi-structured interviews with the teachers indicated that some carry the LP themselves. They were generally not aware that children tend to exhibit this prototype, which explains their inaccurate rating of the items difficulty for the students.

K 11
31 August 2007 08:30 - 10:30
Room: 0.87 Marx
Symposium

Solving information-based problems: Searching, selecting and evaluating information

Chair: **Iwan Wopereis,** Open University of the Netherlands, *Netherlands*
Organiser: **Saskia Brand-Gruwel,** Open University of the Netherlands, *Netherlands*
Discussant: **Jean Francois Rouet,** University of Poitiers, *France*

Presently, we are living in an information society. It is expected that people in all kinds of situations identify information needs, locate appropriate information sources, extract and organize relevant information from each source, and synthesize retrieved information. It is often assumed that students become information literate and master the complex cognitive skill of information problem solving all by themselves. However, research reveals that without adequate support most students are unable to locate information efficiently and effectively. The papers in this symposium revolve different aspect and problems students have during this process of information problem solving. Furthermore, instructional support to foster students' ability to search and select needed information will be discussed. The first paper of Brand-Gruwel and Wopereis presents a model describing the skills involved when solving information-based problems while searching for information on the WWW. The second paper of Kienhues, Bromme and Stadtler addresses how people, while searching for medical information on the WWW, integrate conflicting evidence into a viable framework of personal understanding and decision-making. It cannot be taken for granted that people who deal with conflicting evidence exercise adequate epistemological reasoning spontaneously, or that they engage in epistemological reasoning at all. The third paper presented by Groen will focus on providing people support to locate task-objective relevant information and will empirically test a data-driven psychological model of localising relevant information in unstructured data sets. Finally the paper of Walraven, Brand-Gruwel and Boshuizen will focus on how students and teachers of third year pre-university classes search, judge and select information on the WWW. Special attention is given to the criteria students and teachers use to judge and select information. Results of these research projects is valuable input for designing instructional support to fostering students' ability to select and judge information and sources and become expert information problem solvers.

Information Problem Solving while using Internet for searching information: a descriptive model
Saskia Brand-Gruwel, Open University of the Netherlands, *Netherlands*
Iwan Wopereis, Open University of the Netherlands, *Netherlands*

In contemporary education emphasis is on meaningful learning, knowledge construction and self-directed learning. To stimulate students to construct knowledge in a meaningful way, they get learning tasks and assignments that require them to identify information needs, locate information sources, extract and organize information from each source, and synthesize information from a variety of sources. This set of activities is frequently defined as Information problem solving (IPS) (Eisenberg & Berkowitz, 1990; Brand-Gruwel, Wopereis & Vermetten, 2005). This paper presents a descriptive model depicting the process of information problem solving (IPS) when students use the Internet for searching information (IPS-I-model). In two studies higher education students

solved an information problem while thinking aloud. In order to gain insight in skills students use, the thinking-aloud protocols are analysed in depth using a coding system based on the literature and the protocols, which was tested and re-adjusted in a few iterations. Results of the two studies, on which the IPS-I-model is based, reveal that the IPS process consists of five constituent skills: define information problem, search information, scan information, process information, and organize and present information. Moreover, regulation skills are crucial while solving information problems. The IPS-I-model gives an overview of the constituent and sub skills of the complex cognitive skill of information problem solving using Internet as source of information. The model gives the initial impetus to design IPS instruction. Brand-Gruwel, S., Wopereis, I., & Vermetten, Y. (2005). Information problem solving by experts and novices: Analysis of a complex cognitive skill. Computers in Human Behavior, 21, 487-508. Eisenberg, M. B., & Berkowitz, R. E. (1990).Information problem-solving: The big six skills approach to library and information skills instruction. Norwood, NJ: Ablex.

Dealing with conflicting evidence during Internet search: an investigation of epistemological reasoning and reasoning about ability
Dorothe Kienhues, University of Münster, *Germany*
Rainer Bromme, University of Münster, *Germany*
Marc Stadtler, University of Münster, *Germany*

When people search the web for medical information, they commonly come across conflicting evidence. Such controversial topics are for example screening for breast carcinoma or treatment of high cholesterol. Therefore they have to assess which information is more important and valid than other information, how conflicts between various perspectives of knowledge can be solved and how conflicting evidence could be integrated into a viable framework of personal understanding and decision making. These assessments can be seen as aspects of epistemological reasoning, as it can be assumed that personal beliefs about the nature of knowledge and knowing (epistemological beliefs) play an important role to undertake such assessments. On the other hand, being confronted with conflicting evidence might cause people to question their personal ability to understand a topic. The study (n = 50) addresses two aims. Firstly, in an exploratory approach, it acquires how people get along with conflicting evidence during online search, especially in how far they engage in epistemological reasoning and reasoning about ability spontaneously. Secondly, effects of providing users prompts to distinguish between epistemological concerns and ability concerns as well as to stimulate advanced epistemological reasoning are assessed. Educational implications for fostering essential skills for dealing with information from the web are deduced. Theoretical implications of this study tackle the question of separating beliefs about ability and epistemological beliefs.

Locating task-relevant information in unstructured data sets
Martin Groen, University of Bristol, *United Kingdom*

In educational, but also other institutional, settings, people regularly need to consult external information sources in order to be able to realise task objectives. Examples of these tasks are, pupils who need to write an essay, students writing a term paper or employees working on a monthly sales report. However, humans often find it difficult to locate information in unstructured information sources, such as the Internet (Jenkins, Corritore, & Wiedenbeck, 2003; Schacter, Chung, & Dorr, 1998; Shneiderman, 1997; Smith, Newman, & Parks, 1997), structured information sources, such as academic libraries (Haynes & Wilczynski, 2004; Waldman, 2003) and in synchronous or asynchronous collaboration and coordination systems, such as workflow

systems (Dustdar & Gall, 2003). Therefore, providing support for humans to locate task-objective relevant information could be beneficial, leading to shorter information search time and a swifter task accomplishment. From the literature it is not clear, however, how this support could be provided. There is a paucity of data concerning the mechanisms humans employ to present and locate relevant information. The present work addresses this shortcoming by proposing and empirically testing a data-driven psychological model of localising relevant information in unstructured data sets.

Students' and teachers' judging behaviour when searching the World Wide Web for information.
Amber Walraven, Open University of the Netherlands, *Netherlands*
Saskia Brand-Gruwel, Open University of the Netherlands, *Netherlands*
Els Boshuizen, Open University of the Netherlands, *Netherlands*

Solving information problems is a complex cognitive skill that students of all ages are supposed to have. However, research has shown that many students have problems with this skill. Judging and selecting information is especially problematic for children as well as adults (Britt & Aglinskas, 2002). This study focuses on the way students and teachers of third year pre-university classes search, judge and select information on the WWW. Special attention is given to the criteria students and teachers use to judge and select information. Twenty-three students and twelve teachers received two tasks from different domains (physics, geography or language). After reading the task, participants wrote down their prior knowledge about the subject matter involved. Then, they had 30 minutes per task to find information to accomplish it. Useful information found on the WWW could be copied into a Word-file. Tasks were made individually and participants were instructed to think aloud. A day later, participants gathered in groups for a discussion. In this discussion the criteria they used for selecting information were elaborated on. Results show that the criteria students mention are not always the same criteria they use while solving information problems. Criteria such as audience, author, references and goal were only mentioned and not used. Students also admit that they do not use these criteria while searching the WWW. Teachers are more aware of the origin and author of a site while searching information, but this is only true for tasks in their own subject area. When they lack prior knowledge, judging information becomes more difficult. Britt, M.A., & Aglinskas, C. (2002). Improving students' ability to identify and use source information. Cognition and Instruction, 20(4), 485-522.

K 12
31 August 2007 08:30 - 10:30
Room: 3.67 Békésy
Symposium

Students' values, moral and democratic education in multicultural societies

Chair: **Cees Klaassen,** Radboud University, *Netherlands*
Organiser: **Cees Klaassen,** Radbound University, *Netherlands*
Discussant: **Geert ten Dam,** University of Amsterdam, *Netherlands*

The aims of the symposia are to present potential educational strategies, contents and frameworks for the development and empowerment of the multi dimensional systems of values, moral and

democracy of children and adolescents living in multicultural societies. Four papers from three countries will be presented at the symposium. The first two papers, " Moral education in schools: and" values and knowledge education (VaKE) in European summer campuses for gifted students: Native vs. non native speakers" by Jean-Luc Patry , Sieglinde Weyringer and Alfred Weinberger and " The relationship between the value system and the adaptation of Ethiopian-born adolescent immigrants students" by Eli Shitreet, Nava Maslovaty and Yaacov Iram presents studies dealing with the value system and adaptation of students from different countries to varied educational frameworks and curricula, while the next paper: "The relationship between gender, ethnic origin and adolescents' system of democratic perceptions, attitudes and behavior" by Dorit Alt, Nava Maslovaty and Arie Cohen deals with differences according to background variables : gender and origin of the family in veteran students population. The last paper " Moral education in schools: Teachers authority and students' autonomy" by Brigitte Latzko, deal with cognitive and emotional facets of children's and adolescents morality. The results of the studies presented arise theoretical models and pedagogical implications for developing and constructing students in varied educational frameworks by using different contents and strategies.

Values and Knowledge Education (VaKE) in European summer campuses for gifted students: native vs. non native speakers
Jean-Luc Patry, University of Salzburg, *Austria*
Sieglinde Weyringer, University of Salzburg, *Austria*
Alfred Weinberger, Pädagogische Hochschule der Dioezese, *Austria*

The "Values and Knowledge Education" (VaKE) approach is a constructivist teaching concept in which both values education (Kohlberg) and teaching of content ("knowledge education": Piaget; Glasersfeld) are combined: Starting from a classical Kohlbergian dilemma, the students recognize their information needs and fill the gaps through the internet and other sources. Experience shows that in VaKE the students often learn much more than in regular classes. Since debates are the core elements in this approach, language plays the central role in the process. VaKE has been used for three years in a row in Summer Campuses of one week each with gifted students from ten European countries with native and non native speakers of German (the working language) for a total of about 145 students. The hypothesis is that the non native speakers will have some difficulties at the beginning but then the native speakers will adapt their language to them and they themselves will have accommodated to the language level, so at the end there will be less difference, if any. Two designs were used: a pre-post-follow-up and a process analysis design. After a general overview over the pre-post-follow-up comparisons for native and non native speakers, details on the process analyses are given. The assessments are done using the lesson interruption method: After each unit, the students are asked to respond to a questionnaire referring directly to what was experienced by them in several cognitive domains and how they perceived the respective units. The hypothesis can be specified to say that there is no difference between native and non native speakers in descriptions of the teaching, whereas there are differences in the sense mentioned above in the variables which involve cognitive processing. The results confirm the hypotheses but can be specified.

Moral education in school: Teachers' authority and students' autonomy
Brigitte Latzko, University of Leipzig, *Germany*

This presentation investigates the relationship between authority and autonomy in terms of moral development. Empirical data of several studies is presented: In a questionnaire study 114 students in the age of 15 and 18 years were asked to legitimate their teachers' authority. The findings

suggest that the acceptance of authority does not diminish by age but changes in its quality: confidence seems to play an important role. A second study examining self-attributed moral emotions following rule transgressions in school is shown. Two groups of children and adolescents were interviewed about moral rule transgressions in school: students attending elementary and grammar school and students attending a school for those with special needs (emotional and behavioural deficits). There are significant differences between the two groups. The results indicate that moral emotions are strongly associated with the acceptance of rule transgression. At least data of group discussions and interview studies on autonomy, especially emotional autonomy, in school is presented. The results of all studies will be discussed together in order to derive pedagogical implications. The findings support the importance of emotions in developing a moral identity and highlight the role of autonomy. Therefore education of moral emotions and teachers' autonomy support are as important as the practice of dilemma discussions in school.

The relationship among the value system and the adaptation system of Ethiopian-born adolescent immigrant students

Eli Shitreet, Bar Ilan University, *Israel*
Nava Maslovaty, Bar Ilan University, *Israel*
Yaacov Iram, Bar Ilan University, *Israel*

The aims of the study are: to examine the relationships between the value system of Ethiopia-born adolescent immigrants and their scholastic, social and behavioral adaptation ; and to compare the adaptation system, according to educational framework. Ethiopian-born youth go through acculturation processes in their adaptation to Israeli society. They face the dilemma of preserving the values of their heritage versus internalization of the values and ways of behavior of Israeli society. Berry (1997) suggests four acculturation strategies: integration, assimilation, conservation and marginalization. The adolescents' value system was examined(Schwartz ,1992). The theory, consists of values organized on two bipolar continua: "conservation" versus "openness to change," and "self-enhancement" versus "self-transcendence." Scholastic, social and behavioral adaptations were studied too. Sample: 150 Ethiopian-born adolescents studying in youth villages and in a day school. Questionnaires: a value system questionnaire (PQ) by Schwartz, Lehman & Melch (1999); a questionnaire to identify personal acculturation processes based on Berry's (1997) theory; an adaptation questionnaire (Shitreet, 2006). Findings 1. The girls' behavioral adaptation was higher than boys; positive correlation was found between level of religiosity and adaptation. 2. The more the adolescents valued socially-oriented values, their social and behavioral adaptation increased. 3. "Integration" strategy was connected to an increase in social and behavioral adaptation. "Marginalization" strategy was connected to a decline in most of the adaptation measures. "Assimilation" strategy was connected to a decline in social and behavioral adaptation among the adolescents in the day school. For the "separation" strategy, no clear trend was found. The study confirmed a model to predict the adaptation of Ethiopian born adolescents, combining both Schwartz's and Berry's theories.

The Relationship among gender and ethnic origin and adolescents' system of civil –democratic perceptions, attitudes and behaviors

Dorit Alt, Bar Ilan University, *Israel*
Nava Maslovaty, Bar Ilan University, *Israel*
Arie Cohen, Bar Ilan University, *Israel*

The aim of the research was to examine the relationship of personal background variables such as gender and ethnic origin to adolescents' system of civil-democratic perceptions, attitudes and

behaviors (Ichilov, 2000; Torney-Purta et al., 2001). The study identified four civil-democratic indices that were examined with respect to their relationship to ethnic origin and gender: Morals and social-political justice; Democratic involvement in the school ;Political involvement; Civil-state relations. The research question: what is the system of relationships between civil-democratic indices and ethnic origin and gender among adolescents? FINDINGS: 1.The democratic involvement of female students in school is higher than that of male students; 2. The political involvement of male students is higher than that of female students. Male students supported illegal protest such as spraying graffiti on walls and blocking roads more than female students. 3. Female students support equal rights for immigrants, minorities and women more than male students. 4.With respect to the perception of democratic values: female students are in favor of social equality and freedom of choice more than male students, whereas male students support freedom of expression and liberalism more than female students; 5.The support of equality towards immigrants and women and pluralistic values is statistically significantly lower among pupils of Oriental origin compared to the other ethnic origin groups. Discussion: The contribution of the current research lies in the examination of the relationships between ethnic origin ,gender and civic orientation among adolescents. The study also corroborates the research model that suggests paths for examining systems of relationships between a series of civil-democratic indices among adolescents with respect to ethnic origin and gender.

K 13
31 August 2007 08:30 - 10:30
Room: 0.99
Symposium

Promoting knowledge construction in different online learning scenarios in higher education

Chair: **Ineke Lam,** IVLOS Institute of Education, Utrecht University, *Netherlands*
Organiser: **Teresa Guasch,** Open University of Catalonia, *Spain*
Organiser: **Anna Espasa,** Open University of Catalonia, *Spain*
Organiser: **Päivi Virtanen,** University of Helsinki, *Finland*
Organiser: **Maria Jose Rochera,** University of Barcelona, *Spain*
Discussant: **Anne Nevgi,** University of Helsinki, *Finland*
Discussant: **Alison Hudson,** University of Umea, *Sweden*

The recent investigation of educational computer support scenarios has shown the importance of some elements implied in the knowledge construction processes that carry out the participants during the activities of teaching and learning online. These studies suggest that the nature and characteristics of factors as the cognitive and metacognitive presence, the patterns of participation from a technological point of view or the teaching presence can enhance effective learning in those environments (Garrison, 2003; Garrison & Anderson, 2003; Kanuka & Anderson, 2004). From these assumptions, the symposium deepens in the knowledge construction processes (both, individual and group) that are produced in situations of teaching and learning in different educational computer support scenarios of Higher Education. Our purpose is to analyse different processes of knowledge construction within four computer supported learning settings in Higher Education: Knowledge Forum workspace, interactive on-line tutoring system, virtual campus of the Open University of Catalonia, and Moodle platform. The emphasis is in achieving a deeper

comprehension of different processes in asynchronous learning environments, particularly processes of self-regulation strategies, cognitive presence, metacognitive presence, patterns and teacher presence. And finally to have evidence on how effective learning is promoted through participation in activities of learning online. The proposal has an important scientific and educational relevance due to the different and complementary methodological and theoretical approaches to the comprehension of the processes of learning in different educational computer support scenarios.

Patterns of participation and teaching presence in an asynchronous learning network: connecting structural and content analysis
Cesar Coll, University of Barcelona, *Spain*
Alfonso Bustos, National Autonomous University of Mexico, *Mexico*
Anna Engel, University of Barcelona, *Spain*

Teaching presence was identified by Garrison and Anderson (2003) as a key element, alongside cognitive presence and social presence, in Asynchronous Learning Networks (ALNs). Studies suggest that the way in which participants contribute to teaching presence and are affected by it in online environments is closely related to their degree of participation and to the interactions they establish with the other participants. This study aims to show that participation analysis is a preliminary step that is able to guide the analysis of teaching presence in ALNs, and to contribute elements for understanding and evaluating the characteristics and effects of teaching presence on learning processes. The data analysed correspond to a seminar held in spring 2005 as part of a Doctorate program in Education Psychology. The main corpus of data comprised the log files produced automatically by Knowledge Forum and the participants' posts, transcribed and prepared for later content analysis. The most important results were: the creation and application of a participation analysis model; the identification of typical patterns of participation; the identification of participants whose patterns of participation reveal an important contribution in terms of teaching presence; and finally, the analysis and evaluation of the contributions of these participants from the perspective of teaching presence. The discussion focuses on participation patterns that indicate a high level of teaching presence and explores the roles of the teacher and the students as sources of teaching presence.

Enhancing self-regulative learning by interactive on-line tutoring tool
Päivi Virtanen, University of Helsinki, *Finland*

This follow-up study explores education science students' self-regulative learning strategies and their development from the first year till the fourth year of university studies. Students' (N=42) self-regulation was measured by a self-evaluation questionnaire modified from Pintrich's MSLQ (Motivated Strategies for a Learning Questionnaire) (Pintrich, Smith, Carcia, and McKeachie, 1993). The on-line questionnaire is part of 'IQ Learn' self-evaluation and tutoring tool, developed to enhance higher education students strategic study skills especially self-regulated learning. The qualitative data of this study was collected by focused interviews (n=8-9) in the beginning of the first study year, after the first semester and during the fourth year of studies. During a study skills course 'Orientation to university studies' organised during the first semester students used the IQ Learn tutoring tool to self-evaluate their strategic learning skills. Based on the test results they choose two sectors of strategic learning skills, and made a plan how to develop these qualities, implemented their plan with support of IQ Learn tool's tutorial sets, and reported how they succeed in carrying out the development plan. The test results and interviews revealed that university students' self-regulation vary from skilful to rather naïve and some have obvious

difficulties to regulate phases of their learning, like concentration or time management. It became evident that the self-regulative learning skills are rather stable and developing these skills needs continuous support given by teacher or tutor. The interactive on-line tool IQ Learn was found very useful for the students especially at the early stage of studies, particularly in a role of initiator rising student's consciousness of their own possibilities to affect ones motivation, learning and outcomes.

"Metacognitive presence" in asynchronous online learning environments: self, mutual and hetero-regulation
Elena Barbera, Open University of Catalonia, *Spain*
Antoni Badia, Open University of Catalonia, *Spain*
Teresa Guasch, Open University of Catalonia, *Spain*
Anna Espasa, Open University of Catalonia, *Spain*

There are plenty of results and interest shown in presence studies with regard to social, cognitive and teaching presence as motors for online community of enquiry learning. Nevertheless, little attention is paid to the regulatory aspects of learning. With this background and these studies in mind, our paper proposes to extend the cognitive presence dimension in terms of the metacognitive aspects that are at the heart of deep learning and high-level skills development. Our proposal is based on three types of regulatory process (depending on the person providing the reflective elements and monitoring procedures with regard to their own learning in terms of awareness and self-improvement); ie, distinguishing between self-regulation, mutual regulation and hetero-regulation. These types of regulation are analysed in terms of two levels of analysis: personal and collective level. A specific protocol was applied for dimensions of metacognition, based on both the theory developed from the most relevant contributions and data collected previously in similar scenarios. Four online learning activities (forum, debate, collaborative and individual work) at a wholly online university were selected for analysis, due to their common use in these kinds of learning environments for assignments and assessment activities. The main categories for metacognitive presence in online environments are: 1. Design of study plans; 2. Reflective application of study plans, and 3. Monitoring. These categories are analysed from the personal and collective perspective as mentioned above. Each category has different indicators to meet the specific metacognitive profile of each activity. The results point to particular trends for each learning and teaching activity selected, according to each type of regulation. Likewise, the types of regulation complement each other in terms of the degree and quality of presence at the personal and collective levels. Other interesting results regarding specific metacognitive indicators and relationships are also discussed.

The potential of online discussions for effective learning. Combining individual and social perspective to study cognitive presence
Maria Jose Rochera, University of Barcelona, *Spain*
Teresa Mauri, University of Barcelona, *Spain*
Javier Onrubia, University of Barcelona, *Spain*
Ines de Gispert, University of Barcelona, *Spain*

The aim of this study is to describe and analyse the processes of the individual and social construction of knowledge, as reflected in the cognitive presence in participants' contributions, in a text-based asynchronous learning environment. From a socioconstructivist perspective of teaching and learning, the analysis focused on the relationships among cognitive level of posts submitted by participants, the degree of learning of the contents, and sociocognitive level of the

discussion (Gunawardena et al, 1997; Järvelä & Häkkinen, 2000; Garrison, 2003). We have analyzed the contributions posted by the participants (both the teacher and her 17 students) in a debate forum on "homogeneous groups as a marker of attention to diversity" over a 3-week period. The debate forum was a part of a broader Moodle course on "Educational Psychology". The most interesting results point out several types and levels of cognitive presence, depending on (1) the cognitive level of the participants' individual posts, the functional and contextualized use of the contents that these posts show, and the evolution of these two variables; and (2) the profundity and progress of the sociocognitive process of the discussion. Furthermore, the results show that effective learning depends on the congruencies and discrepancies that are established between the different levels of cognitive presence and its evolution. Taken together, the results of this study improve our understanding of both the characteristics and the evolution of the processes of individual and social construction of knowledge in online discussions, and shows that the analysis of cognitive presence is a valid procedure for understanding the quality of learning in a text-based asynchronous learning environment.

K 14
31 August 2007 08:30 - 10:30
Room: 0.100B
Symposium

Facilitating and analysing roles in computer-supported collaborative learning

Chair: **Armin Weinberger,** Ludwig Maximillians University, *Germany*
Organiser: **Jan-Willem Strijbos,** Leiden University, *Netherlands*
Organiser: **Armin Weinberger,** Ludwig Maximillians University, *Germany*
Discussant: **Sanna Järvelä,** Oulu University, *Finland*

During the past five years, the 'role' concept has become a promising construct for facilitating and analysing Computer-Supported Collaborative Learning (CSCL). Roles can be defined as more or less explicit functions or responsibilities to guide individual members' behaviour and regulate their group interaction (Hare, 1994). Roles can promote awareness of the overall group performance and member's contribution (Strijbos, Martens, Jochems, & Broers, 2004). However, the role distribution is not always optimal from a learning viewpoint, and some students are more inclined to take up a role voluntarily. In CSCL research roughly two perspectives regarding roles exist: scripted roles that aim to facilitate collaborative learning processes and roles that emerge spontaneously developed by the participants in support of their collaborative learning activities. Scripted roles perspective. Roles can be assigned to learners as instructional support to structure the collaborative process; this is also referred to as 'scripting' (O'Donnell & Dansereau, 1992; Dillenbourg 2002; Weinberger, 2003). These roles are either content-oriented or process-oriented. A content-oriented role, like a summarizer, has been found to stimulate higher levels of knowledge acquisition (Schellens, Van Keer, & Valcke, in press). A process-oriented role specifies members' individual responsibilities to stimulate coordination (Strijbos et al., 2004). Emergent spontaneous roles perspective. Roles can emerge spontaneously without scripting being provided (Strijbos, De Laat, Martens, & Jochems, 2005), and the concept of roles can be applied to analyze the individual contributions and interaction patterns during collaborative learning (De Laat, 2005; Hermann, Jahnke, & Loser, 2004; Pilkington & Walker, 2003). This symposium will focus on both

perspectives – the scripting of roles for instructional support and the analysis of spontaneous roles during collaborative learning. The symposium contributions will address the feasibility of these applications and explore how these seemingly diverse perspectives can be integrated.

Prototypical roles in group work: A conceptual framework for the design of a tool for teachers
Jan-Willem Strijbos, Leiden University, *Netherlands*
Maarten de Laat, University of Exeter, *United Kingdom*

During the past five years, the 'role' concept has become a promising construct for facilitating and analysing Computer-Supported Collaborative Learning (CSCL). In CSCL research there are roughly two perspectives regarding roles: scripted roles that aimto facilitate collaborative learning processes and emergent roles developed spontaneously by the participants in support of their collaborative learning activities. Scripted roles can be assigned to learners to structure the collaborative process; this is also referred to as 'scripting' (O'Donnell & Dansereau, 1992), and are content-oriented or process-oriented. A content-oriented role, e.g. summarizer, appears to stimulate knowledge acquisition (Schellens, Van Keer, & Valcke, 2005), whereas a process-oriented role specifies members' individual responsibilities to stimulate coordination (Strijbos, Martens, Jochems, & Broers, 2007). Roles can also emerge spontaneously without any scripting being provided (De Laat, 2006). The concept of roles can then be applied to analyze students' individual contributions and interaction patterns during collaborative learning (Pilkington & Walker, 2003). The recent methodological development and discussion signifies that we as researchers struggle to find satisfactory ways to make sense of these complex interactions. However this is not an end in itself. Our efforts should not only serve our analytical and theoretical needs, but should also be transformed into 'tools for teachers' to provide them with the adequate support needed to implement CSCL in the classroom. In this contribution a conceptual framework consisting of prototypical roles, defined along three dimensions, is presented to describe student activity in both small groups (where roles are frequently scripted) and large groups (where roles are frequently spontaneous). The goal is to provide a framework that a) facilitates a meaningful description of student behaviour, and b) can be handled with relative ease by teachers to evaluate group work.

Role scripts for improving group learning beyond individual learning: Does it work?
Armin Weinberger, Ludwig Maximillians University, *Germany*
Karsten Stegmann, Ludwig Maximillians University, *Germany*
Frank Fischer, Ludwig Maximillians University, *Germany*

Studies show that computer-supported collaborative learners frequently suffer from process losses and seem to have difficulties to distribute roles effectively. Hence, individual learning may outperform collaborative learning if learners are not supported to take over complementary roles. Computer-supported scripts seem to be able to facilitate specific processes and outcomes of computer-supported collaborative learning (CSCL), such as domain-specific knowledge and domain-general, e.g., argumentative knowledge. In this study with a 2×2-factorial design (n = 72) we investigate the effects of a script (with vs. without) and the social form of learning (individual vs. collaborative) on learning processes and outcomes in the context of an online learning environment in higher education. Results show that the script facilitated the construction of arguments within the computer-supported learning environment as well as knowledge acquisition. The results indicate that collaborative learning may outperform individual learning regarding learning outcomes when it is structured by a script.

Roles as structuring tool in online discussion groups: Studying students' role performance and the impact on knowledge construction
Bram De Wever, Gent University, *Belgium*
Tammy Schellens, Gent University, *Belgium*
Hilde Van Keer, Gent University, *Belgium*
Martin Valcke, Gent University, *Belgium*

This contribution connects the results of three successive studies on the introduction of roles as a scripting tool in order to structure asynchronous discussion groups. The studies fit in with the search for instructional approaches stimulating social knowledge construction in e-discussions. More specifically, this contribution fits in with the abovementioned scripted roles perspective. The introduction of five roles was examined: starter, summariser, moderator, theoretician, and source searcher. The studies were conducted in a naturalistic higher education setting with freshmen enrolled in the course Instructional Sciences. Asynchronous discussion groups of ten students were organised to foster students' processing of the learning content. Four successive authentic tasks of three weeks each were presented and roles were assigned to students in order to promote knowledge construction through social negotiation. This contribution focuses first on exploring whether students enacted the roles they were assigned. Subsequently, the impact of assigning roles on knowledge construction is studied. In order to determine the level of knowledge construction, content analysis based on the interaction analysis model of Gunawardena, Lowe, and Anderson (1997) was performed. Taking into account the hierarchical nesting of students in discussion groups and the successive nature of the themes, repeated-measures multilevel modelling was applied. Concerning role assignment, the results confirm that all students enact the assigned roles. Moreover, although source searchers, theoreticians, summarisers, and students without roles in the role condition focused to a lesser extent on some activities related to other roles, students generally did not neglect other activities. Concerning the impact of roles, this contribution shows a positive effect on students' social knowledge construction, especially when roles are used as a structuring tool at the beginning. This implies that the moment of introduction is important: roles should be introduced at the start of the discussions and can be faded out towards the end.

Boundaries and roles: Social location and bridging work in the Virtual Math Teams (VMT) online community
Johann Sarmiento, Drexel University, *USA*
Wesley Shumar, Drexel University, *USA*

As research in Computer-Supported Collaborative Learning (CSCL) expands its understanding of diverse types of joint learning activities and the participation frameworks they enact, new perspectives on how social reality is constructed become necessary for analysis and design purposes. Our research concentrates on the temporal development of online learning groups into teams and communities and the interactional emergence of positioning or situated roles —dynamic orientations toward participation in small-group interaction. We investigate the ways that small virtual teams engaged in sustained work over time cross over the boundaries of time, episodes, collectivities, and perspectives to constitute and advance learning and knowledge-building as a continuous activity. We refer to this interactional activity as "bridging" work. While engaged in bridging work, team members position themselves, their co-participants and other collectivities dynamically in ways that suggest the need to consider the "situatedness" aspect of the concept of role in CSCL research. Bridging activity, and the positioning work it entails, contributes to the construction and maintenance of a joint problem space over time, to manage ongoing participation, and to the constitution of the temporal imagination of the collectivities involved.

The dynamics of social roles within a knowledge management community
Isa Jahnke, University of Bochum, *Germany*

As research in Computer-Supported Collaborative Learning (CSCL) expands its understanding of diverse types of joint learning activities and the participation frameworks they enact, new perspectives on how social reality is constructed become necessary for analysis and design purposes. Our research concentrates on the temporal development of online learning groups into teams and communities and the interactional emergence of positioning or situated roles —dynamic orientations toward participation in small-group interaction. We investigate the ways that small virtual teams engaged in sustained work over time cross over the boundaries of time, episodes, collectivities, and perspectives to constitute and advance learning and knowledge-building as a continuous activity. We refer to this interactional activity as "bridging" work. While engaged in bridging work, team members position themselves, their co-participants and other collectivities dynamically in ways that suggest the need to consider the "situatedness" aspect of the concept of role in CSCL research. Bridging activity, and the positioning work it entails, contributes to the construction and maintenance of a joint problem space over time, to manage ongoing participation, and to the constitution of the temporal imagination of the collectivities involved.

K 15
31 August 2007 08:30 - 10:30
Room: 0.81 Ortvay
Symposium

Further understanding of the processes involved in the self-regulation of writing.

Chair: **Eduardo Cascallar,** Assessment Group International; Leiden University, *Belgium*
Organiser: **Monique Boekaerts,** Leiden University, *Netherlands*
Discussant: **Pietro Boscolo,** University of Padova, *Italy*
Discussant: **Susan Nolen,** University of Washington, *USA*

It is the aim of this symposium to demonstrate that self-regulation in relation to writing is a complex process that involves many different, interacting strategies. Any writing activity that students engage in is always situated. It involves a dialogue between the writer and a real or imagined reader. In order to understand the students' attempts at self-regulation during the writing process it is essential to open a window on the conditional knowledge they have access to and the accessibility and use of (meta-) cognitive, motivational, and volitional strategies. In the symposium, we will focus on the interplay between cognitive and affective/motivational strategies during self-regulated writing. We will also explore the relations between students' strategy use and their perception of classroom interactions. In the classroom, self-regulated writing is situated in a social and instructional context. Learners perceive the writing task, the instructions, the tools provided, and the social agents that are present in terms of affordances and constraints that are created. In recent years, increasing emphasis has been given to teacher-student interactions and peer interactions as important determinants of self-regulated writing.

Towards Self-regulated Academic Writing: an exploratory study with graduate students in a situated learning environment.
Montserrat Castello, LLull University, *Spain*
Carles Monereo, Autonomous University of Barcelona, *Spain*
Anna Inesta, LLull University, *Spain*

As a situated process, self-regulation in writing depends on the interaction between the representation of the communicative situation, the writer's knowledge, goals and emotions and the already written and read texts (Bathkin, 1986; Ivanic, 1998; Hyland, 2000; Castellô & Monereo, 2005). With this in mind, an exploratory study was designed with graduate students to explore how emotional, social and cognitive factors interact during the process of writing an academic research text. Qualitative and quantitative data were collected regarding the participants' representation of the communicative situation, their goals and expectations, the characteristics of their composition process, and the cognitive and emotional problems perceived during the composition process. Finally, we considered the overall quality of the written texts. Statistical analyses were made to determine the weight of the different variables in the process and discourse analysis allowed us to analyze the quality of peer interactions. Preliminary results show that process regulation and final text quality depend on the participants' ability to manage affective variables, especially anxiety.

What role do epistemic beliefs play in self-regulated writing?
Jeroen Rozendaal, Leiden University, *Netherlands*
Cornelis de Brabander, Leiden University, *Netherlands*
Monique Boekaerts, Leiden University, *Netherlands*

In this study, we investigate the epistemic beliefs of students in secondary vocational education (SVE) and the relation of these beliefs with various determinants of self-regulated (SR) writing. Epistemic beliefs refer to personal ideas about the validity of knowledge and the process by which opinions are validated as knowledge (Rozendaal, de Brabander, Minnaert, & Bouwman, submitted). We operationalized Boekaerts' (1997) six component model of SR-learning for the writing domain. This resulted in an assessment instrument (DISI) that includes generic and process measures of content knowledge, cognitive strategy use, cognitive self-regulation, meta-cognitive knowledge and beliefs (including epistemic beliefs), motivational strategy use, and motivational self-regulation in the writing domain. These concepts are assessed in 1500 first year SVE students. The results will indicate whether (subgroups of) first year SVE students are able to give a relatively coherent characterization of knowledge. This is measured by the CAEB-instrument (Connotative Aspects of Epistemic Beliefs; Kienhues, Stahl, & Bromme, 2005), which contains bipolar contrasts, like "simple vs. complex", "stable vs. unstable", "certain vs. uncertain". The respondent is required to connect these explicit labels to his concept of "knowledge". This instrument appeared adequate to measure epistemic beliefs in former studies. Furthermore, this study will explore relations of epistemic beliefs with a wide array of cognitive and motivational determinants of SR-writing. Research into epistemic beliefs is largely absent in the context of SVE and relations between epistemic beliefs and determinants of SR-writing, apart from studies on argumentation skills (Hofer & Pintrich, 1997), are scarce (see Comerford, 1999; Lee, 1995; Miller, 2003). However, with Ruth (1988) we expect epistemic beliefs to (1) play an important role in determining the differences in writing ability between students, (2) form a way to trace abstract thinking that fosters writing ability and (3) influence the quality of argumentation.

Co-regulation of students' writing activity in the classroom.
Linda Allal, University of Geneva, *Switzerland*

Increasing importance has been given in recent years to situating self-regulation in social and instructional contexts. In our conceptual framework, the "co-regulation" of learning activities results from the interplay between contextual factors (affordances of the learning situation, teacher-student interactions, peer interactions, tools embedded in the situation) and processes of self-regulation in which learners engage. The study presented here examines the relations between regulations linked to classroom interactions and students' self-regulations during an activity of text production and revision. The data concern a writing activity carried out in three fifth-grade classes and then repeated, a year later, in the same classes in sixth grade. A qualitative analysis of the interactions in each class is used to interpret between-class differences on several quantitative indicators of students' transformations of their texts (as shown by repeated measures ANOVA). In addition, the dialectical character of co-regulation is illustrated by a case study of a student who encounters difficulties with writing; it is shown how she contributes to classroom interactions, in whole-class and in dyadic settings, and how these interactions influence, in return, her way of regulating her writing activity.

K 16
31 August 2007 08:30 - 10:30
Room: 0.89 Jedlik
Symposium

Building knowledge in a community of learners

Chair: **Jos Beishuizen,** Vrije Universiteit Amsterdam, *Netherlands*
Chair: **Mireia Montane Tuca,** Ministry of Education, Catalunya, *Spain*
Organiser: **Jos Beishuizen,** Vrije Universiteit Amsterdam, *Netherlands*
Discussant: **Marlene Scardamalia,** Ontario Institute for the Study of Education, *Canada*

The concept of "community of learners" was coined by Ann Brown and Joseph Campione. In a community of learners students are considered as partners in the process of knowledge development by inquiry learning. Students are immersed in a culture of collaboratively conducting research and sharing empirical findings . Various related perspectives have been developed, like the concept of "knowledge building communities", introduced by Carl Bereiter and Marlene Scardamalia. Within the socio-cultural tradition, Bert van Oers elaborated the concept of developmental education, in which the coherent development of students' cognitive, affective and psychomotor capacities is emphasized, taking the concept of the zone of proximal development as an educational perspective. These theoretical conceptions and practical orientations shed further light on the way students collaboratively with fellow students, teachers and other experts (like researchers) build knowledge in a game or inquiry learning setting. This symposium aims to compare the various concepts by discussing empirical and theoretical contributions from each of the three aforementioned perspectives. An elaboration on five characteristics of knowledge building will be followed by a presentation of two projects in Dutch classrooms in which the concepts of the community of learners and of developmental education have been put to the empirical test. Consequenses of these findings of the education and professional development of teachers will discussed.

Initiating students into a knowledge-creating civilization
Carl Bereiter, Ontario Institute for the Study of Education, *Canada*
Marlene Scardamalia, Ontario Institute for the Study of Education, *Canada*

The industrialized nations constitute something new in the world: a knowledge-creating civilization, committed to advancing all the frontiers of knowledge. Sustained knowledge advancement is seen as essential for social progress of all kinds and for the solution of societal problems. Accordingly, the fundamental task of education in the modern world is to enculturate youth into this knowledge-creating civilization and to help them find a place in it. Knowledge building, as an educational approach, represents an attempt to refashion education in a fundamental way, so that it becomes a coherent effort to initiate students into a knowledge creating culture. It involves students not only developing knowledge building competencies but also students coming to see themselves and their work as part of the civilization-wide effort to advance knowledge frontiers. In this presentation we discuss five characteristics of knowledge building that distinguish it from both traditional education and newer project- or activity-based approaches.

Towards the design of learning environments that optimize learning processes in pre-vocational secondary education
Annoesjka Boersma, Universiteit van Amsterdam, *Netherlands*
Geert ten Dam, Universiteit van Amsterdam, *Netherlands*
Monique Volman, Vrije Universiteit Amsterdam, *Netherlands*
Wim Wardekker, Vrije Universiteit Amsterdam, *Netherlands*

The innovation of pre-vocational education that has been undertaken in the last decade has aimed at a better connection of schooling with the learning needs of youngsters. The sphere of work is often taken as a meaningful context for learning within which students are stimulated to develop both general and vocational competences. In this paper we explore the usefulness of 'communities of learners' and 'communities of practice' as basic concepts in a conceptual framework for the innovation of learning environments in vocational education. In the first part of the paper some issues associated with combining the concepts 'communities of practice' and 'communities of learners', are discussed, resulting in a theoretical framework consisting of four parameters defining a community of learners in pre-vocational education as a 'second generation apprenticeship system': shared learning, meaningful learning, reflective learning, and a focus on transferable learning outcomes. In the second part, the results of a collective instrumental case study in four classes in two pre-vocational secondary schools are presented. The case study focussed on the question whether and how, the parameters of the theoretical framework of a 'community of learners in pre-vocational education' are manifest in the teaching-learning processes in the observed classes. Data were collected through classroom observations, a series of interviews with teachers and interviews with students. The interviews with teachers and students focussed on 8 'critical incidents' recorded during the classroom observations. On the whole, our results show that merely working with simulated work situations in the school is not sufficient to create the kind second generation apprenticeship system that we started out with as an ideal context for learning. By way of conclusion, we discuss how the observed learning environments could be improved with the four parameters as guidelines.

The Sparkling School: A secondary school community of learners
Lisette van Rens, Vrije Universiteit Amsterdam, *Netherlands*
Joop van der Schee, Vrije Universiteit Amsterdam, *Netherlands*
Jos Beishuizen, Vrije Universiteit Amsterdam, *Netherlands*

The Sparkling School is a joint project of an urban secondary school and the Centre for Educational Training, Assessment and Research of the Vrije Universiteit in Amsterdam. Together, students, their teachers, university students, researchers and teacher educators establish a community of learners in which (1) students are considered as serious partners in a process of knowledge building, (2) students and teachers collaborate in order to answer questions according to the method of inquiry learning, (3)the research questions clarify big ideas in the domain of research, (4) students are immersed in a culture of scientific research, in which they learn to work with research methods, rules for collaboration and scientific communication, (5) students learn to reflect on methods and rules, on principles and schemas on the basis of concrete experience and on the value of their work for science and society, and (6) students get access to resources and equipment for research. The research projects developed up until now have been closely monitored with various instruments: video recordings, interviews, document analysis, achievement tests and questionnaires. Data will be reported on the extent to which a community of learners has been established and on the effects on students' understanding of research methods and appreciation of scientific research. Embedding a research project in the ongoing curriculum appeared to be one of the predominant success factors.

International partneships for knowledge building communities: An emerging model for teacher development
Mireia Montane Tuca, Ministry of Education, Catalunya, *Spain*

International cooperation is approached from an organizational perspective. As regards teacher development, four aspects of a partnership dynamics are emphasized: First, knowledge building community as a shared vision; second, diversity of expertise, third, local/global participation, and last, pluri-level innovation. The principles of Knowledge Forum are integrated in our research as a new generation cognitive-oriented technology and pedagogy. Diversity of expertise is linked to the engagement of several experts in the process of adoption, implementation and institutionalization of the innovation. Local grounding communities between primary, secondary and adult schools, been supported by universities, and their participation in a worldwide network is also stressed. The pluri-institutional cooperation is approached as a social innovation. A case study of an international partnership including universities, schools and governments between Catalunya and Quebec is briefly presented along this framework. Data has been gathered by local university and ministry research teams using ethnographic methods, including interviews and participant observation of online Knowledge Forum databases and video-recording. Researchers and practitioners of different cultures converge to improve the classroom by transforming it into a local and international knowledge building community. Teacher expertise, technology experts, instruction and curriculum experts, cognitive science experts, evaluation experts, and pupils and students as experts create knowledge building communities, with parents support. And there may be a student teacher presenting the knowledge building principles in the classroom, and the classroom teacher coaches another classroom teacher, or a graduate student feeding back data analysis to a knowledge building community. Diversity of expertise is thought to be key to a successful knowledge building partnership. After a qualitative evaluation, results point to specific conditions for these four dynamics to be operative. The four dynamics identified and their

conditions are suggested as constituents of an emerging model regarding partnerships for international knowledge building communities.

K 17
31 August 2007 08:30 - 10:30
Room: 7.59
Symposium

Digital concept maps for the integrative visualization and communication of knowledge and informatio

Chair: **Sigmar-Olaf Tergan,** Knowledge Media Research Center, *Germany*
Organiser: **Sigmar-Olaf Tergan,** Knowledge Media Research Center, *Germany*
Organiser: **Tanja Engelmann,** Knowledge Media Research Center, *Germany*
Discussant: **Matthias Nückles,** Institute for Psychology University of Göttingen, *Germany*

The visualization of knowledge and information has become a central method to cope with the increasing complexity and ill-structuredness of subject matter. Visualizations concerning structures of knowledge and information are suggested to help to access, to elicit, (co-)construct, structure and restructure, elaborate, evaluate, locate and access, communicate, and use ideas, thoughts and knowledge about relevant content and resources (Jonassen, Beissner, & Yacci, 1993; Jonassen, Reeves, Hong, Harvey, & Peters, 1997). Particularly in online educational and workplace scenarios visualizations may play an important role to represent basic information structures inherent in a subject-matter domain as well as knowledge about the semantic interrelationships between task-relevant information elements inherent in the information resources. Advanced digital concept maps have been shown to have the potential to represent and visualize not only conceptual knowledge, but also content knowledge about a domain, as well as knowledge resources in a coherent and integrative format (Caóas et al., 2005; Tergan, 2005). Because of their representational power digital concept maps may be used as cognitive tools for the integrated representation and communication of knowledge and information in a variety of educational and workplace settings (Tergan, Keller & Burkhard, 2006). Concept map-based visualizations of the semantic structure of information may help users getting easy access to task-relevant information because searching for relevant information is based on an understanding of the inherent semantics of the represented domain. The aim of this symposium is to present recent empirical research on the potentials and effects of digital concept maps for supporting the integrative communication of knowledge and information in online education and workplace scenarios. Current approaches as well as perspectives for research and application will be in focus.

Digital concept maps for the visualization and communication of knowledge and information in online educational counseling scenarios
Sigmar-Olaf Tergan, Knowledge Media Research Center, *Germany*
Tanja Engelmann, Knowledge Media Research Center, *Germany*

In order to support self-regulated access to task-relevant information it seems to be important for instructors and counselors to communicate not only basic information structures inherent in a subject-matter domain but also knowledge about the semantic interrelationships between task-relevant information elements inherent in the information resources. Visualizations of the semantic

structure of information are suggested to help users getting easy access to task-relevant information because it is based on an understanding of the inherent semantics of a domain. Digital interactive concept maps may be used as a "bridging technology" to represent both task-relevant knowledge and information in an integrative format and to visualize the semantic structure inherent in the task-relevant section of the represented domain. The paper reports about an experimental study aimed at assessing the efficacy of digital concept maps for an integrated representation and communication of knowledge and information in an online counseling scenario. A digital interactive concept map and a digital interactive concept list are compared. Both types of tools provide interactive access to hyper-linked text-based documents. However, the tools differ with respect to the explicitness in visualizing semantic relations between task-relevant contents located in the single documents. We ask whether the explicit representation of semantic relationships inherent in the contents of a set of pre-selected information resources by means of a digital concept map may help fostering access to problem relevant information and answering problem-relevant questions - as compared to a hierarchically structured digital concept list with no visualization of semantic relations. The amount of correct answers, the time needed for answering different types of questions, the degree of cognitive load, and the acceptability of the technique used for communicating task-relevant information are assessed. Results of the study are reported, theoretical implications and prospects for using digital concept maps for communicating knowledge and information are discussed.

Concept-map based knowledge and information visualization for fostering computer-supported collaboration
Tanja Engelmann, Knowledge Media Research Center, *Germany*
Sigmar-Olaf Tergan, Knowledge Media Research Center, *Germany*

Computer-supported collaboration is still problematic with regard to the interaction between the spatially distributed group members. However, there is an increasing need to collaborate computer-supported, because in times of globalization collaboration by experts who are located at different places is becoming increasingly crucial. One of the reasons for the interaction problems in computer-supported collaboration is the reduced context information, like the reduced nonverbal communication or the reduced communication of emotional signals, compared to face to face collaborations. In this paper an innovative approach to tackle these interaction problems is presented. This new approach is based on visualizations of group members' individual knowledge and information underlying this knowledge that are made available to the group. Realized as digital concept maps this knowledge and information visualizations foster "knowledge and information awareness". Knowledge and information awareness is defined as awareness of group members regarding their collaborators' knowledge and the information underlying this knowledge. In an experimental study (N = 30 triads) the efficiency of knowledge and information awareness on computer-supported collaboration could be confirmed by comparing an experimental condition, in which groups were provided with an environment for fostering knowledge and information awareness, and a control condition, in which the groups had no access to this environment.

A study of the use of concept maps and knowledge models to organize and communicate a complex technical knowledge domain
John W. Coffey, Univ. of Florida; IHMC Pensacola, *USA*

Digital concept maps have been proposed as a visual organizing factor for information and knowledge resources in educational settings. A new course is being developed that will use a knowledge model, an aggregate of digital concept maps and other digital resources, as a visual

organizer for this course. The new course, entitled "XML-based Internet-enabled Applications" pertains to XML programming for Web-based applications. A software tool named CmapTools will be used to develop and deliver the course. It is difficult to understand the relationships among the many recommendations, standards and proprietary technologies that comprise the XML universe. Structuring the course around concept maps seems well suited to facilitate understanding of this complex domain. Additionally, the need to organize the many accompanying resources that this course will require: side-by-side comparisons of codings of XML documents, example documents from within the CmapTools environment, pages at the W3C website and other recommendation websites, etc., suggests that this knowledge modeling scheme will provide an ideal framework for the course. Student accesses to the knowledge model will be logged and analyzed in order to determine patterns of interaction. Data on student performance in the course, on a learning style inventory, and on ways that they accessed the knowledge model will be analyzed and the results presented in this forum. Additionally, students will complete a survey that will address their perceptions of the utility of this representation relative to other course material organizers, particularly to the learning management system (LMS) currently employed at the University of West Florida, Pensacola, FL, USA.

NatureGate® a R&D and business program in progress: content knowledge, information, digital concept mapping

Mauri Ahlberg, Faculty of Beh. Sciences, University of Helsinki, *Finland*

In Finland, we are building a NatureGate¯ server. Summer 2007, it will be opened in the WWW. Its core will be thousands (later on, at least up to 350 000) high quality photographs of flowering plant and habitats. All Scandinavian, and most of Europe's flowering plants have been systematically photographed, many of them from seed to flowering stage and even to fruit stage. The photographs are linked to concepts, and texts describing content of photographs. Furthermore they will be linked to other reliable sources in the WWW. Concept maps will be used for visualizing content knowledge and information resources. In the paper I'll elaborate ideas concerning the intended research on the use of concept maps for representing and communicating in an integrated manner knowledge and information resources. The first NatureGate¯ server will promote life long learning in formal, non-formal and informal contexts, including educational and workplace settings. CmapTools will be offered as a free tool to visualise and communicate content knowledge, to manage knowledge, to share knowledge, to learn and collaboratively construct knowledge, using many kinds of information resources. CmapTools would allow a very fast possibility for uploading own digital photographs and video clips to the NatureGate¯ server. I am personally in the process of creating examples of how photographs of plants could be organised in many ways, e.g. into taxonomic structures, into evolutionary and ecosystem models, attached by texts, and linked to reliable digital resources and information in the WWW. When users themselves are using concept maps and CmapTools, it will provide data for research on learning, thinking, and problem solving, e.g. in biology education, in environmental education and in education for sustainable development.

K 18
31 August 2007 08:30 - 10:30
Room: 0.100C
Symposium

School-leisure conflict and learning motivation

Chair: **Manfred Hofer,** University of Mannheim, *Germany*
Organiser: **Manfred Hofer,** University of Mannheim, *Germany*
Organiser: **Thea Peetsma,** University of Amsterdam, *Netherlands*
Discussant: **Jenefer Husman,** Arizona State University, *USA*

In order to understand why some pupils persist in their learning and others give up more easily it is important not only to look at pupils' level of motivation to learn but also to consider competing action alternatives.Several studies show that nowadays students in their everyday life deal with a multiplicity of goals, many of them being non-academic in nature. They carry out a wide range of activities, strive for multiple goals (Lanz & Rosnati, 2002), and have future time perspectives in different life domains (Peetsma, 1997, 2000). Therefore, under certain circumstances, academic goals may come in rivalry with non-academic goals (Hofer et al., 2006; Lens et al., 2005). In this symposium, the rivalry between school and extracurricular goals, conditions that influence possible conflicts, effects of conflicts on performance and well-being, and variables moderating trade-offs will be treated. One line of research on school-leisure conflict deals with the effects of the quantity and quality of out-of-school activities on study-outcomes and well-being. Situational and personality variables moderating and mediating resistance to temptation will be examined. In the realm of cognitions, effects of time perspectives regarding leisure and school on students' self-regulated learning behaviour are studied. Also, individual value orientations are investigated as predictors and effects of learning regulation following learning-leisure conflicts. School-leisure conflicts are a widespread phenomenon among nowadays pupils and university students (Fries et al., 2005). Current theories of learning motivation usually model academic behaviour as depending solely on factors the learner attributes to the learning behaviour and its consequences. The scientific relevance of the symposium lies in dealing with the effects of competing attractive alternatives on learning.

Time engagement in out-of-school activities, study outcomes and well-being: Moderating effects of task motivation and task characteristics
Eva Derous, University of Rotterdam, *Netherlands*
Willy Lens, University of Leuven, *Belgium*

After-school employment and leisure activities have become major activities in students' lives. This study investigated how extracurricular activities affect students' well-being and study-outcomes. Negative effects typically arise because engagement in extracurricular activities takes time away from studying, which may lower study attitudes and grades. Whereas previous studies mainly investigated the quantity of engagement, the present research focused also on the quality of this engagement. Using theories of role conflict, job design and motivation, we investigated whether (a) type of extracurricular activity (work vs. leisure), (b) work-study conflict, (c) quality of work, and (d) motivation to perform part-time work, could explain the effects of time investment in extracurricular activities on undergraduates' study attitude, academic performance, and well-being. Participants were 230 undergraduate students of a large public university. A series of hierarchical regressions show that spending too much time in extracurricular activities (both

working and leisure activities) is negative for students' well-being and study outcomes. However, task characteristics and type of motivation to engage in out-of-school activities moderated this effect. Specifically, spillover was less negative, if extracurricular activities were performed in an autonomous way. To date the overall focus has been on the negative impact of combining studying and out-of-school activities, however, out-of-school activities may be an invaluable contribution to undergraduates' personal and professional development. It is important to consider the conditions under which role accumulation promotes enrichment to a greater extent than it promotes conflict. Theoretical and practical implications are discussed.

I can resist everything except temptation: Effects of action orientation and listlessness on resistance to temptation
Nicola Baumann, University of Osnabrueck, *Germany*

Low resistance to temptation and high listlessness are two phenomena often observed in educational settings. The author proposes an inverse relationship between listlessness and resistance to temptation for individuals who are low in self-motivation (i.e., state-oriented individuals): Feeling listless, inert, and sluggish is expected to deprive state-oriented individuals from resources necessary to resist temptation. In contrast, individuals who are high in self-motivation (i.e., action-oriented individuals) are expected to overcome states of reduced positive affect and to resist temptation despite feeling listless. Resistance to temptation was assessed by participants' performance on a visual discrimination task during distraction compared to baseline episodes. Consistent with expectations, listlessness was not associated with reduced resistance to temptation unless participants were state-oriented. Access to the "implicit self" is discussed as a potential mediator that helps action-oriented participants to overcome instances of listlessness and motivate themselves to stay focused on boring tasks despite more interesting alternatives. Self-access was assessed by a preference for own name letters. Consistent with assumptions, listlessness was associated with increased access to implicit self-representations in action-oriented participants. The mediation model, however, was not significant. The direct relationship between predictor variables (listlessness and action orientation) remained significant when controlling for the indicator of self-access.

Effects of time perspectives regarding leisure time on the development of motivation for school and academic achievement of students in the lowest level of secondary school in the Netherlands
Ineke van der Veen, University of Amsterdam, *Netherlands*
Thea Peetsma, University of Amsterdam, *Netherlands*

This study focuses on effects of perspectives regarding leisure time on the development in motivation for school and academic achievement of students in the lowest level of secondary school in the Netherlands. It is increasingly recognized that the learning context is an important factor in explaining students' motivation for school. Often, the motivation for school of students in the lowest school level has been reported to be quite low, and the percentage of early school leavers high. A possible explanation for a lower motivation is that perspectives on other domains of life than school can interfere with students' motivation for school. Non-academic goals may become in conflict with academic goals. Over 1500 12-13 year old students in year 1 and year 2 participated in the study. In a period of 12 months a self-report questionnaire was administered four times during regular class time. The questionnaire included scales on long and short-term perspectives on leisure time, motivational beliefs and self-regulated learning behaviour. Furthermore, report marks were collected. Indeed we found that the long-term future time

perspective regarding leisure time is negatively related with the development in self-regulated learning behaviour and academic achievement.

The reciprocal relation between values and motivational interference during learning and leisure
Manfred Hofer, University of Mannheim, *Germany*
Sebastian Schmid, University of Mannheim, *Germany*
Stefan Fries, University of Mannheim, *Germany*

The reciprocal relationship between values and motivational interference is studied longitudinally with a two-year interval. At the first measurement, participants were 6th and 8th graders. Value orientations were measured by value prototypes depicting typical modern (achievement-oriented) and post-modern (well-being oriented) students. Motivational interference during learning as well as during leisure was assessed by a scenario technique, in which two situations of motivational conflict were depicted. Pupils answered items indicating distractibility and mood when choosing the school or the leisure option. In regression analyses, t1-measures of values and their interaction were used as predictors for motivational interference at t2 while controlling for motivational interference at t1, and vice-versa. The higher pupils were in modern values, the lower their motivational interference was during learning after a school-leisure conflict, but only when post-modern values were low. Pupils high in modern values indicated higher motivational interference during leisure but, again, only if they were low in post-modern values. These results are consistent with the interpretation that values determine the experience of motivational conflict. Interestingly, motivational interference had an impact on values two years later. Pupils experiencing high distractibility during learning consequently value the enjoyment of leisure time more than before. The more pupils enjoyed leisure, the less weight they consequently gave to academic goals. Pupils observing themselves as being highly absorbed in learning and not being distracted easily eventually value learning outcomes as more important and grade down hedonic values. In summary, pupils' values lead their behaviour but foregoing experiences in a life area also shape their values.

K 19
31 August 2007 08:30 - 10:30
Room: 0.100D
Symposium

Improvement of learning and self-regulation with different methods of self-monitoring

Chair: **Michaela Glaeser-Zikuda,** University of Freiburg, *Germany*
Chair: **Meike Landmann,** Technical University of Darmstadt, *Germany*
Organiser: **Michaela Glaeser-Zikuda,** University of Freiburg, *Germany*
Organiser: **Meike Landmann,** Technical University of Darmstadt, *Germany*
Discussant: **Mary Ainley,** University of Melbourne, *Australia*

Self-regulation skills are supportive to cope with changing environments as well with requirements in context of learning and studying (Zimmerman, 2000). Self-monitoring understood as a systematic observation and documentation of thoughts, feelings and actions regarding goal attainment, is the basis of self-regulation (Bandura, 1982; Zimmerman, 2000). Clear evidence

support reactivity effects due to self-monitoring, meaning that the registered behaviour is modified in the desired direction (e. g. Korotitsch & Nelson-Gray, 1999). This symposium deals with the question, with which kind of instruments the documentation and reflection of learning processes could be enhanced and self-monitoring could be systematically supported. The presentations introduce to different self-monitoring methods like portfolios, structured diaries or web based monitoring-tools and their benefit regarding the enhancement of learning and self regulation processes. The instruments presented in the studies were used solely as well as in combination with other interventions (e. g. trainings, seminars, lessons). The group of participants in the studies are diverse (e.g. students, teacher students, and job-seekers). Within the different studies a variety of methodological approaches is presented (e.g. qualitative content analysis, process-analysis, and descriptive and inferential statistics). The purpose of the symposium is to discuss the potential of the presented self-monitoring methods to enhance self-regulation and learning processes.

Potential of portfolios to promote students' self-regulation and achievement
Tanja Lindacher, University of Education Ludwigsburg, *Germany*
Michaela Glaeser-Zikuda, University of Freiburg, *Germany*

Learning is considered to be a dynamic conceptualization including self-regulation processes of cognitive, motivational and emotional factors. Because of new and demanding tasks in school and education self-regulation skills are becoming more and more important. To develop and enhance those skills portfolios offer many possibilities. In this presentation we will focus on two studies. In the first one we present qualitative and quantitative analyses of portfolios from 8th grade physics students. In the second one the effects of a portfolio intervention in 10th grade history classrooms are presented. The high potential of portfolio for the enhancement of self-regulation is discussed.

Self-regulated learning during internship – a diary study with student teachers
Tina Hascher, University of Salzburg, *Austria*

As is known from research on school learning, one possibility of supporting and attending self-regulated learning is the use of learning-diaries.46 teacher students from the University of Bern wrote daily semi-structured diaries in their practicum and reported their learning outcomes. All situations were analyzed by qualitative content analysis regarding the forms of learning, the learning topics, the time-course of learning and the learning support. The presentation will give an overview of student teachers' field experiences, their learning processes during internship and will illustrate the importance of self-regulated learning as well as coaching by the mentors in school.

Enhancing self-regulated learning in primary school – Process evaluation of a students' training based on learning diaries
Barbara Otto, Technical University of Darmstadt, *Germany*
Franziska Perels, Technical University of Darmstadt, *Germany*
Bernd Schmitz, Technical University of Darmstadt, *Germany*

A training was developed and evaluated which aimed at the enhancement of students' self-regulated learning. The training concept bases on the process model of self-regulation (Schmitz & Wiese, 2006), which differentiates between three phases in each learning process: the pre-action, the action and the post-action phase. In sum, 105 4th graders of German elementary school participated voluntarily within the intervention study. The student training consisted of seven weekly training sessions that covered learning strategies of all three phases. By having a training duration of six weeks, it was possible to evaluate the intervention processually by a learning diary.

The students had to fill out a learning diary every day just before and after learning. These process data was analysed with trend analyses as well as interrupted time-series analyses. For almost all variables, significant trends in the expected direction were found. The interrupted time-series analyses confirmed partly the expected effects. In summary, the results allow the conclusion that it is possible to enhance students' self-regulatory competences by a training intervention with supporting learning diaries.

Self-monitoring as a central element of Vienna E-Lecturing
Dominik Lapka, University of Vienna, *Austria*
Petra Wagner, University of Applied Sciences Linz, *Austria*
Ralph Reimann, University of Vienna, *Austria*
Barbara Schober, University of Vienna, *Austria*
Petra Gradinger, University of Vienna, *Austria*
Christiane Spiel, University of Vienna, *Austria*

Self regulation is considered as an important condition for successful learning. Even though this competence should be achieved in schools, many young adults studying at the university are still lacking skills of self regulated learning. Above all self monitoring is pointed out as a central part in the process of self-regulation. Consequently academic programs, which foster among domain-specific expertise also self regulation competences, have to encourage in particular self monitoring. In this context the Vienna E-Lecturing (VEL) program was developed. VEL is a long term intervention of one year duration and is totally integrated in an obligatory lecture at the University of Vienna (methods of research and evaluation). The theoretical background of VEL is provided by the process model of self-regulated learning (Schmitz, 2001). VEL follows a blended learning concept and combines virtual learning modules and face to face sessions. A central element of VEL is self-monitoring. Following components of VEL foster self-monitoring via the virtual learning platform, namely self-regulation exercises, self-tests and checklists. In the training sessions self monitoring is fostered through a reflexion phase, the analyses of learning problems and the implementation of a learning diary. Data were collected before, during and after the intervention. The sample consists of 84 participants of VEL and additional 84 students, which served as matched controls. In the speech we will present quantitative and qualitative data concerning self-monitoring. First results indicate a slight increase of self-monitoring among the VEL-participants.

Effects of a guided self-reflection Diary on the improvement of self-regulatory skills and vocational goal attainment
Meike Landmann, Technical University of Darmstadt, *Germany*
Bernd Schmitz, Technical University of Darmstadt, *Germany*

Aim of the present study is the evaluation of a guided self-reflection diary based on daily self-observation in case of professional reentrance or reorientation. The main question is to what extent self-regulatory skills and the attainment of self defined vocational goals could be enhanced by the use of a guided self-reflection diary in comparison to a self-regulation classroom training. The study is based on theories of self-regulation (Zimmerman, 2000) with special focus on self-monitoring (Bandura, 1991; Korotitsch & Nelson-Gray, 1999). The content of the training and the diary refers to the four phases of the Rubikon-Model of Heckhausen (1989) and Gollwitzer (1990). A 2x2 design compared four groups: a) group with guided self-reflection diary, b) group with classroom training, c) group with training and guided self-reflection diary, and d) waiting control group. The presentation focuses on the effect of the solely use of a daily guided self-reflection

diary, without any other kind of intervention. The sample consists of 91 women in situations of vocational reorientation and reemployment. The guided self-reflection diary was filled out over a period of 42 days. In the training conditions the women took part in seven sessions, two hours each. Additionally all persons filled out one questionnaire three times: before, after and three months after the intervention. The effectiveness of the intervention was demonstrated by using MANOVA and trend analyses. The results evidenced significant improvements in self-regulatory skills and goal attainment by the guided self-reflection diary. With respect to practical implications further analyses pointed to individual characteristics, which have shown to have an impact on the use and the benefit of a guided self-reflection diary.

K 20
31 August 2007 08:30 - 10:30
Room: 0.79 Jánossy
Symposium

Preschoolers' competencies in Mathematics and Science: Possibilites for enhancing development

Chair: **Kevin Miller,** University of Michigan, *USA*
Organiser: **Henrik Saalbach,** ETH Zurich, *Switzerland*
Discussant: **Ilonca Hardy,** Max Planck Institute for Human Development, *Germany*
Discussant: **Mutsumi Imai,** Keio University at Shonan-Fujisawa, *Japan*

Within the discussion about educational reform, the implementation of successful learning environments during preschool years is pivotal since here foundations are laid for students' cognitive development in various academic domains. Given the realm of children's informal learning experiences before entering preschool settings, research on children's cognitive development is vital for the design of successful learning environments. Especially in the domains of mathematics and science, there is ample evidence for the early development of domain-specific competencies, sometimes framed as naïve theories. At the same time, there exists great variability in children's performance on various measures of early competencies, indicating the potential for an enhancement of early experiences in these domains. In order to design learning environments that successfully build on individual competencies to foster advanced conceptual knowledge, educators thus need to consider both general developmental trajectories and individual variability in various domains of development. In this symposium, we will report on a range of early competencies within the domains of mathematics and science and address their implications for the design of learning environments. Two presentations will deal with early mathematics, one addressing individual differences in children's spontaneous focusing on numerosity and numerical ordering and the other one focusing on preschoolers' performance in a numerical sequencing task and its predictive validity for later development during elementary school. Two further presentations focus on early scientific understanding, one presenting data on preschoolers' understanding of motion in different task contexts and the other one reporting findings on preschoolers' inductive reasoning in comparison tasks involving the concept of material kind. The final presentation will involve analyses of early learning environments that are informed by research on cognitive development. The discussant will comment the potential success of learning environments, as implied by this research, for fostering preschoolers' understanding of mathematics and science concepts.

Spontaneous focusing on numerosity and numerical order related to early counting development
Minna M. Hannula, University of Turku, *Finland*
Marianne Eskola, University of Turku, *Finland*
Erno Lehtinen, University of Turku, *Finland*

Using number skills (like exact number recognition) in natural surroundings is not an automatic, but intentional act – the amount of practice young children acquire in using their early number skills differs substantially according to how frequently they focus on numerical properties. Studying these attentional processes provides an improved understanding of all necessary sub-processes of numerical skills and of domain-specific indicators of how much practice children spontaneously acquire in using their numerical skills. The present longitudinal study is the first to explore children's focusing on numerical order in addition to their Spontaneous FOcusing on Numerosity (SFON) tendency. Noticing that some items are organized in numerical order requires well-integrated cardinal and ordinal aspects of the numberline, and this focusing skill may thus appear later and be more tightly intertwined with the development of counting skills than SFON tendency. Results showed individual differences in numerical focusing tasks and a moderate average measure intraclass correlation across the 5 SFON tasks and 3 numerical focusing tasks. Children's focusing on numerical order increased during this period. Differences in correlations between SFON, focusing on numerical order and counting skills indicate that SFON and focusing on numerical order may tap on different sub-processes of counting development.

Quantity sequencing in preschool: Predicting complex mathematics skills at primary school
Henrik Saalbach, ETH Zurich, *Switzerland*
Uta Guhne, Universität Leipzig, *Germany*
Lennart Schalk, Max Planck Institute for Human Development, *Germany*
Elsbeth Stern, ETH Zurich, *Switzerland*

The present study focuses on ancestor skills of academic skills in mathematics which can be acquired and taught during the preschool years. It is widely known that formal instruction for higher order mathematics at school builds on skills which need to be developed during preschool. The aim of the present study is to test whether and how preschoolers understanding of quantity sequencing, i.e. the noticing and knowledge of the ordering of items according to their quantity, can predict their performance on complex word problems in late primary school. Children in the last year of preschool were tested on the so-called Quantity Sequence Test (QST; German: Mengenfolge-Test; Guthke, 1983). Three years later, a part of the same sample was tested on mathematical word problem solving, number sequencing, and reading. We found that children's quantity sequencing in preschool correlated highest with their later performance on word problems (.52). This correlation remained high even when the influence of intelligence was controlled. The early construction of the QST further allowed us to conduct a comparison between two different points of measurement (1972 vs. 2002). This allowed us to compare the outcome concerning maths skills of two contrasting preschool programs, namely the systematic and unified program of Eastern Germany and the system of preschool education in Germany in 2002 which lacked any systematic agenda. We found that (East German) preschoolers in 1972 did significantly better than preschoolers in 2002. The pattern of our results suggests that (1) the ability to understand sequences of quantities in preschool is a reliable predictor for the ability of mathematical modelling, as required by word problems, in late primary school; and (2) that adequate mathematical training of children prior to their entrance into formal education may have a positive impact on this ability.

Preschoolers' induction of the concept of material kind: A study on the
Henrik Saalbach, ETH Zurich, *Switzerland*
Ilonca Hardy, Max Planck Institute for Human Development, *Germany*

The process of comparison has been found to be a crucial mechanism underlying young children's categorization of objects. Through the hypothesized "structural alignment" of objects, important common properties may be discovered. In science education, comparison is the basic cognitive process involved in students' inductive reasoning, whereby patterns and structures are identified across instances as a basis for the construction of theories and rules. Our study investigates young children's ability to employ comparison processes in order to form conceptual categories regarding the concept of material kind within the context of objects' "floating and sinking." In an experimental within-groups design, we have five-year-olds observe either how one object made of a certain material is immersed in water (one standard condition) or how two objects made of the same material are immersed in water (two standard condition) in total of 12 tasks. To test the importance of language in the comparison process, we further vary whether the standards shown to the children are unlabelled or whether they are labelled with respect to the material they consist of. After having observed the standard/s, the child is shown four objects, only one of which is made of the same material as the observed standard(s) while the others serve as distractors because of shape, mass, or volume. The findings of this ongoing study show that children improved from the one-standard unlabelled condition to the two-standard labelled condition on average from 39% to 58% (N = 16). Apparently, the presentation of two same-material objects and the assignment of the common property of either sinking or floating to both of them already induced comparison processes in five-year-olds, who were thus able to overcome their prevalent tendency toward the distracting items. Further applications in early science learning which induce processes of comparison are thus implicated by this research.

Implementing learning environments within the context of play for children aged 4-8
Miriam Leuchter, Teacher Training University of Central Switzerland, *Switzerland*

The importance attributed to the education and learning of children aged 4-8 has substantially grown in recent years. In Switzerland, models were conceived to integrate the previously independent levels of kindergarten and the first two grades of primary school. The goal is to relieve the strain of starting school as a sensitive phase of children's educational biography. A theory of teaching for children aged 4-8 specifies requirements for teaching and learning in this age group, integrating aspects of related disciplines: pedagogy contributes reflections on normative and historically founded theories concerning the education and learning of children aged 4-8, and provides links to existing curricula. Developmental psychology allows research to focus on the target group and their potential of learning and development. Here, research findings on the development of preschooler's competencies, as in the domains of mathematics and science, are especially important in providing the basis for considerations about fruitful elements of early learning environments. In this research project, conditions and processes of classroom teaching and learning with children aged 4-8 are examined in view of designing learning settings within the context of play which foster and support problem-based and self-directed learning of children. In a first step, playing, learning and teaching settings for mathematics and science are implemented. Cooperating with educators and experts in curriculum development, the research group develops learning and teaching settings and supports implementation. Video-based case studies are taken as a support for educators in the process of belief revision. They also provide a means of coding instructional practices within specific settings aimed at fostering children's mathematics and science competencies, building on their scientific intuitions. The knowledge thus gained will, in a

later step, be used for teacher formation and further education and for developing instructional designs for children aged 4-8.

K 21
31 August 2007 08:30 - 10:30
Room: 1.58
Symposium

Understanding classrooms: Alternative theoretical perspectives

Chair: **Ruhama Even,** Weizmann Institute of Science, *Israel*
Organiser: **David Clarke,** University of Melbourne, *Australia*
Discussant: **Ruhama Even,** Weizmann Institute of Science, *Israel*

Contemporary research methods provide access to classroom data of a level of complexity and sophistication greater than any previously available. The use of video technology and sophisticated analytical software provide tools to support increasingly sophisticated analyses of classroom phenomena – both learning and instructional activities and their conjunction in classroom practice. Empowered by these tools, researchers are able to apply (and refine) theoretical frameworks of increasing subtlety and complexity to the task of understanding the processes and products of classroom settings. In this symposium, educational researchers from four very specific theoretical persuasions report their attempts to relate particular theories to the phenomena of classrooms. Each theory affords particular analytical strategies and each produces distinctive findings: the products of the particular analytical stance adopted. What are the contemporary theoretical lenses through which we might now consider classroom practice and the products of that practice? Each paper presents a different, highly-contemporary, theoretical approach to classroom research and the analysis of classroom data. It is hoped that the combination of perspectives will provide an opportunity for consideration of the extent to which the various theories are complementary, mutually informing, or, perhaps, incommensurable.

The optimisation of learning in science classrooms from the perspective of distributed cognition
Li Hua Xu, University of Melbourne, *Australia*
David Clarke, University of Melbourne, *Australia*

This paper reports multi-layered analyses of student learning in a science classroom using the theoretical lens of distributed cognition. Building on the insights generated from previous research employing distributed cognition, the particular focus of this study has been placed on the public space of interaction that includes both participants' interactions with each other and their interactions with artefacts in their environment. Focusing on the event of student experimental design, two science lessons were videotaped, in which a class of grade-seven participants were investigating the scientific theme of gravity by designing parachutes and pendulums. The video-stimulated post-lesson interviews with both the teacher and the student groups offered complementary accounts which assisted the interpretation of the classroom data. The findings of this study provide supporting evidence to demonstrate the capacity of distributed cognition in advancing our understanding of the nature of learning in science classrooms.

Connecting student learning and classroom teaching through the variation framework
Ference Marton, University of Gothenburg, *Sweden*
Ming Fai Pang, University of Hong Kong, *Hong Kong*

In a recent paper in The Harvard Educational Review, Graham Nuthall, has called attention to the lacking link between student learning and classroom teaching (2004). This lack is as evident in educational research as is in the minds of teachers. Lack in the first respect means that research does offer any theoretical tools for teachers for learning from their own experiences, hence lack in the first respect contributes to lack in the second respect. Accordingly, "Teachers often feel that learning outcomes are unpredictable, mysterious and uncontrollable" (Kennedy, 1999 quoted by Nuthall, 2004 p 276). The aim of our presentation is to describe a framework, the variation framework from phenomenography, which we believe to be useful in connecting student learning and classroom teaching. By using it, researchers can learn about the nature of the relationship between the two, and teachers can learn from their own experiences about how their students' learning relates to their teaching. This can be done by telling apart what is critical in teaching for the students' learning, from what is not critical. First, however, we have to point out the kind of learning outcomes in relation to which features of teaching might be critical.

Researching classrooms: Complexity and chaos
Mike Radford, Canterbury Christ Church University, *United Kingdom*

This paper presents a critical review of complexity theory in relation to educational research. The 'analytical reductionist' approach is one in which the educational researcher seeks to reduce complex wholes to particular factors and to identify correlations between them and desirable outcomes. Complexity theory shows how this approach in social research is both unreliable within its own terms of reference and misdirected. Complexity theory is characterised by a number of features. These include recognition that educational systems contain multiple variables. These connect in non-linear and dynamic ways, i.e. where factors are seen to interact in a causal relationship the effects do not necessarily relate proportionally to the cause, and few factors may interact with many and many may interact with few. The crucial point of focus is on (a) the nature of the connections that are products of previous interactions reaching into the particular history of the organisation, and (b) the constitutive nature of relationships between interacting factors. Three broad conclusions emerge. The first is that contrary to the promise of reductionist analytical methodologies, research cannot deliver the specific kinds of information that are expected to inform policy and practice. The primary role of educational research becomes one of providing descriptions and explanations that provide a broader perspective on development in which decisions are primarily situation-specific. The second is to recognise that school improvement (a) rests on problematic assumptions about desirable outcomes and (b) is dependent on multiple interacting variables and is thus likely to be local and temporary. The third conclusion is that, rather than seeking to understand schools in terms of factor analysis, research needs to look at the nature of information flow and its constitutive impact on clusters of possible causes and effects.

K 22
31 August 2007 08:30 - 10:30
Room: 0.58 Ruff
Symposium

Professional identities and learning in working life. Theoretical and methodological issues.

Chair: **Leif Christian Lahn,** University of Oslo, *Norway*
Organiser: **Anneli Eteläpelto,** University of Jyväskylä, *Finland*
Discussant: **Stephen Billett,** Griffith University, *Australia*

Increased global economic competition and rapid societal transformations represent challenges to the professions, their members and work organizations. As a consequence, workers need continuously reconstruct and negotiate their identities and expertise – and see themselves as lifelong learners. During the last decades, research on learning at work has turned towards more contextual approaches that take into account the institutional and technological context of professional practice and workers' conceptions of themselves. Recent approaches like "communities of practice" are insufficient when we want to understand, e.g., boundary crossing and multiple identities needed in the knowledge economies. Several theoretical approaches have been used in order to develop a better understanding of the processes of constructing professional knowledge and identities. Some researchers prefer a system perspective, others emphasize a deeper sensitivity towards subjectivities and identities. Socio-cultural framework addresses the interdependence between self, structure and human agency. The range of methodological approaches and strategies also encompasses a large variety of both longitudinal and multilevel strategies. In this symposium we will review and discuss contrasting theoretical and methodological positions in research on professional identities and learning. The symposium includes studies taking a life history perspective or looking at professional development from the standpoint of Wenger's social learning theory and from the viewpoint of subject-centered socio-cultural approach. One presentation is following computer engineers into working life through the theoretical lenses of Foucault. Also concepts derived from the sociology of knowledge (Knorr Cetina) and post-structural feminist theory will be discussed. The relevance and usefulness of the different positions are discussed through a review of empirical studies from professional contexts like teaching, nursing, engineering, designing, researching and accounting.

Learning trajectories in the construction of professional expertise and identity
Karen Jensen, University of Oslo, *Norway*
Leif Christian Lahn, University of Oslo, *Norway*

The present paper is based on the Norwegian project ProLearn ("Professional learning in a changing working life", 2004-2008). One of its key objectives is theoretical and methodological innovation that has put the concept of "learning trajectories" under scrutiny, and introduced "epistemic trajectories". Another objective is to study candidates within teaching, nursing, accountancy and engineering – during their last year at school and their transition into professional life (after two and four years at work). The data were collected through a national survey and semi-structured interviews, focus-group interviews and learning logs. We addressed the following themes: Transition from school to work, present work tasks, commitment to work, job-based learning, training provisions, use of knowledge media (literature, manuals, web etc), professional

identity. In this paper we will present some results from the learning logs. These were constructed as a short questionnaire with open-ended answers. The idea was to trigger reports from our informants on problems (critical incidents) encountered during their work day. A total of 138 logs (days) were filled out. Our summaries of the logs demonstrate that the work environments that the novices enter are quite versatile and provide new challenges almost every day. However there are certain distinct ways of framing the problems and combining different resources when handling non-routine tasks. It is concluded from these results that the time scale of learning trajectories should be extended from critical incidents to a more complex social construction of professional expertise and identity. For example, in nursing the identification with a medical field of expertise in combination with heavy investments in training and supervision factors contributed to a strong learning orientation.

The negotiations of teachers' professional identity in the socio-cultural context of work organizations
Katja Vahasantanen, University of Jyväskylä, *Finland*
Päivi Hokka, University of Jyväskylä, *Finland*
Anneli Eteläpelto, University of Jyväskylä, *Finland*
Helena Rasku-Puttonen, University of Jyväskylä, *Finland*
Karen Littleton, The Open University Milton Keynes, *United Kingdom*

Recent studies within a socio-cultural framework have addressed teachers' professional identity as the interplay between self, structure and human agency. However, we need to go beyond the existing research to gain a more elaborated understanding of the interdependence between work organizations and teachers' identity negotiations. This paper focuses on the question of how professional identities are negotiated between individuals and work organizations. We analyze and describe identity negotiations in two different work organizations: a vocational institution and a university department of teacher education. The vocational institution is large with a hierarchical structure and there have been under way many reforms. The teacher education department is a relatively large and traditional work community with a sustainable work culture, and there have been no dramatic organizational reforms. The empirical data consist of two separate data sets from the two organizations. The data were gathered by open-ended interviews focusing on individual teachers' own experiences. The data were analysed in accordance with various data-driven qualitative approaches. Our findings demonstrate how different organizations provide spaces and resources for teachers' professional identity negotiations. Our results show, that teachers are more committed to their work organizations if they have enough professional autonomy in their organizations. Interaction and relations between the socio-cultural context of work organizations and teachers' identity negotiations are discussed in terms of the meaning of professional autonomy and power relations.

Post-structural feminist approach in understanding gendered practices in academia
Jaana Saarinen, University of Jyväskylä, *Finland*

This study addresses on women researchers in academia using the concept of subjectivities derived from post-structural feminist theories. This paper aims to examine gendered practices as they occur in research work carried out in academic context. The study focuses on how woman researchers negotiate and construct their professional subjectivities: What kind of challenges do they face at different stages of their career, as PhD-students and as post doc -researchers, and what are their career expectations when they are pursuing academic careers? Theoretical underpinnings of the study consist of post-structural feminist theorising and narrative research approach.

Concepts of gender, subjectivity, emotions and agency are conceptualised in post-structural feminist framework. Identity is understood as a dynamic process emerged from inter-subjective discourses, experiences and emotions. Researchers' subjectivity is seen to be constructed and re-reconstructed through the social interaction that the researchers have in particular socio-cultural, historical and institutional context. The data of the study is gathered through open interviews of twelve women working and in different fields of Finnish universities. Narrative approach is used in analysing and describing how subjects are telling their research work processes and identities. Results describe the processes by which the women researchers are involved in the academic practices of knowledge production. The study also demonstrates which factors are related to individual researcher's ways of knowing. The factors include researchers' personal histories, their work experiences as well as academic traditions and theorising in the field. Additionally, discussions with colleagues and constraints of work organisations arising from neo-liberal public management are important for women researchers' in their negotiation of subjectivities.

Knowledge cultures and the identity construction of the learning professional
Monika Nerland, University of Oslo, *Norway*

This paper examines the ways in which professional knowledge cultures – that is, the ways in which knowledge is produced, accumulated, distributed and collectively approached – serve to construct the learning professional in specific ways. Using the concept of "epistemic cultures" (Knorr Cetina) and the Foucauldian notion of power/knowledge as points of departure, the professional domains of teaching and computer engineering in Norway are explored as to what it means to engage in learning and how the learning activities are shaped within the different domains. The two cases illustrate profound differences in ways of organizing knowledge and patterning learning and identity construction. The knowledge culture of the teaching profession stresses the need of differentiation in the way the professional work is performed, whereas the culture of computer engineering advocates the need of standardization and consistency. In the teaching profession knowledge tends to be mediated in personal interaction and enacted by the individual teacher with concern for the current needs of the student. In computer engineering knowledge is typically mediated through a range of artifacts and collectively shared objects, making workplace learning a matter of identifying and applying apt standards and patterns of "best practice" in short-term sequences of problem solving. Consequently, whereas professional development in the teaching profession largely is constructed as forms of experiential learning, the access to and utilization of codified and universal knowledge is given emphasis in computer engineering. The paper discusses the implications of the different constructions for individuals and professional communities alike. It is argued that the two cases illustrate critical issues for knowledge work in today's society as to balancing the quest for collective standards and the provision of shared profession-specific knowledge with the concern for discretion and individual freedom.

K 23
31 August 2007 08:30 - 10:30
Room: 1.60
Symposium

Talking mind(s)-constructing map(s)

Chair: **Ely Kozminsky,** Ben-Gurion University, *Israel*
Organiser: **Ely Kozminsky,** Ben-Gurion University, *Israel*
Organiser: **Elaine Cockburn,** University of Nottingham, *United Kingdom*
Discussant: **Erica de Vries,** Pierre Mendes France University, *France*

Numerous reviews and meta-analyses of research have established that maps, diagrams and other forms of constructed or presented graphic organizers, are helpful in developing or understanding an argument, an exposition, or other types of written or spoken discourse (CaÔas et al., 2003; Horton et al., 1993; Moore & Readence, 1984; Nesbit & Adesope, 2006). What is remaining to discuss is why. Initial explanations pointed out the similarity between internal semantic networks and their external maps layout. Later explanations point to the advantage of spatial perception (Winn, 1994), which facilitates inference processes (Larkin & Simon, 1987). The symposium participants propose that these perceptual rules should be considered in instructing users in how to construct or "read" the diagrams. Similarly, standard forms that are assigned particular pragmatic roles and standardized spatial organization of nodes and links that is congruent with their perceptual perception should also be considered. All those, I would like to propose, are qualities of "good" models: external representations that facilitate the production and interpretation of explanatory discourse. The external model is an object for explanation processes of an individual (self-explanation) or a group. A good model lubricates/facilitates the explanation process. But what is a "good" model?

Boxes and skeletons: scaffolding mind map construction for 7-9 year old children.
Elaine Cockburn, University of Nottingham, *United Kingdom*
Shaaron Ainsworth, University of Nottingham, *United Kingdom*
Colin Harrison, University of Nottingham, *United Kingdom*

Mind maps are a type of node and link diagram beginning with a central concept surrounded by hierarchical tree structures of related concepts. Various claims are made for the usefulness of such diagrammatic forms of text. Construction of such representations requires a number of interrelated skills and this study aimed to analyse this repertoire to identify the necessary skills, together with structural supports that could be offered to scaffold the process for young children. In two studies with 7 to 9 year olds, the benefits of providing two different forms of structure were explored: boxes for keyword generation and blank templates for improved structure on mind maps. Results showed that both these interventions were successful - text boxes had a beneficial effect on the number of keywords generated, while a mind map template aided the production of more structured maps.

Secondary notation in argumentative diagrams
Marije van Amelsvoort, Tilburg University, *Netherlands*

We present four studies on secondary notation in argumentative diagrams. Argumentative diagrams are diagrams that display arguments in boxes and relations between those boxes in arrows. They can be beneficial for argumentation-based learning, because they can give overview

and show structure and relations. However, in previous studies students seemed not to benefit from diagrams much. We believe this is related to the way students construct and use the diagrams, focusing on the content of the boxes without paying attention to overall structure. They do not use secondary notation. Secondary notation is described as extra information you can convey outside of the formal definition of boxes and arrows. For example, readability can be improved when related boxes are placed close together. In a first study, we investigated whether students who receive a short training on secondary notation are able to improve their diagram. A control group did not receive the training. Results show that students indeed improved their diagrams. For example, experts rated the diagrams after training as qualitatively better than the ones made before and the ones made in the control condition. We conclude that secondary notation is relatively easy to learn and may be important for learning. A range of small experiments is now carried out to investigate secondary notation of argumentative diagrams further. For example, we investigate how experts in argumentation construct argumentative diagrams. Results of these studies will also be discussed in Budapest.

Text concept mapping: The contribution of text mapping to comprehension levels
Nurit Nathan, Kaye Academic College of Education, *Israel*
Ely Kozminsky, Ben-Gurion University, *Israel*

A Text Concept Map (TCM) is a graphic representation of a text that visually and verbally depicts the text's main ideas, and the relationships between them. The TCM exposes the rhetoric development of the text, differentiating between the content and the rhetorical concepts, by revealing the semantic-logical interrelations between them. TCM reduces the learners' working memory load, and it can be used as a constraining frame that enables the learners to focus more on "high order" thinking during text comprehension. The precise usage of concepts in the TCM, is congruent with the characteristics of Language of Thinking" (LOT) construct. We assume that combining TCM and LOT instruction for studying texts result in improved comprehension, especially at higher thinking levels. We present a study in which we investigated the use of TCM combined with LOT for studying texts, and its effects on four levels of comprehension (details, inference, application, and opinion) of 112 eight grade students. There is an advantage of the combined TCM & LOT and TCM interventions for the inference and application levels, compared to LOT. The meta-cognitive processes performed during TCM and LOT, support their assimilation in the learner's mind, so he can use them as "standard models", which enable him to "talk" with the text and with himself.

Are good concept maps always better for prior knowledge activation? Interactions of map coherence, background knowledge, and levels of understanding
Johannes Gurlitt, University of Freiburg, *Germany*
Alexander Renkl, University of Freiburg, *Germany*
Lucie Faulhaber, University of Freiburg, *Germany*

Two experiments were theoretically motivated to examine characteristic affordances of concept maps and extending coherence-effects from text-comprehension (McNamara, Kintsch, Songer, & Kintsch, 1996) to prior knowledge activation. Therefore we investigated effects of high- and low-coherence prior knowledge activation on cognitive processes and learning success. Low-coherent prior knowledge activation was operationalized by creating-and-labeling-the-lines between provided concepts, high-coherent prior knowledge activation by labeling existing lines in a concept-mapping task. The first experiment showed that different concept-mapping tasks elicit qualitative differences in prior knowledge activation processes. In the second experiment, we

investigated how different prior knowledge activation affects learning success in a hypertext environment. Subjects with two different levels of expertise (43 high-school and 45 physics university students) were randomly assigned to three conditions (1) labeling-existing-lines (2) creating-and labeling-lines and (3) a control group with no prior knowledge activation. Preliminary results confirm a positive effect of expertise, a positive effect of prior knowledge activation, and an interaction between expertise and the coherence of prior knowledge activation for questions assessing the understanding of higher-order-structures.

K 24
31 August 2007 08:30 - 10:30
Room: 1.71 Pócza
Symposium

Building Dynamic Mental Models from Visualizations (II)

Chair: **Richard K. Lowe,** Curtin University of Technology, *Australia*
Organiser: **Wolfgang Schnotz,** University of Koblenz-Landau, *Germany*
Organiser: **Richard Lowe,** Curtin University of Technology, *Australia*
Discussant: **Neil Schwartz,** California State University Chico, *USA*

Instruction frequently aims at the learner's understanding of dynamic systems, which requires the individual to construct a dynamic mental model of the system and to perform mental simulations by 'running' the mental model in order to solve specific tasks. A frequent assumption hold by practitioners is that the temporal characteristics of an external visual representation should correspond to those of the represented content. This would imply that static pictures should be used to display static content because they lead to the construction of a static mental model, whereas animated pictures should be used to display dynamic content because they lead to the construction of a dynamic mental model. A more detailed consideration reveals however that this is not the case. Static pictures are not limited to supporting the construction of static mental models, but can also be the basis for constructing dynamic mental models and dynamic visualisations are not limited to supporting the construction of dynamic mental models but can also lead to the construction of static mental models. This symposium will argue for a unified approach to dealing with visualizations with a special focus on constructing dynamic mental models from visualizations, regardless whether these visualizations are static or dynamic. It will analyze the nature of dynamic mental models in different domains using different methodological approaches, and it will focus on the question how dynamic perceptual schemata and prior knowledge about dynamic events can be used in the construction of dynamic mental models from external visual displays. Instead of the simple, but misleading research question, whether dynamic visualizations are more effective than static ones or not for the construction of dynamic mental models, the symposium will address the question, when (i.e. under which conditions) which kind of visualization will be more beneficial for the construction of dynamic mental models.

Understanding dynamic mental models from learners' visualizations
Barbara Tversky, Columbia Teachers College/Stanford University, *USA*
Resa Kelly, San Jose State University, *USA*
Oswaldo Garcia, San Francisco State University, *USA*

One reason that animated graphics are not more effective for teaching processes that occur in time is that people think about such events as sequences of discrete steps rather than as continuous processes. This suggests that knowing the steps of complex processes should aid in the design of effective visualizations. Asking beginning learners and experts to generate their own visualizations as well as verbal explanations provides clues to the steps as well as to visual devices. Two projects, one in meteorology and the other in chemistry, will illustrate the technique and it's outcomes.

Learning about dynamic systems by drawing for yourself and for others
Shaaron Ainsworth, University of Nottingham, *United Kingdom*
Josie Galpin, University of Nottingham, *United Kingdom*
Susannah Musgrove, University of Nottingham, *United Kingdom*

The construction of graphical representations such as diagrams has been found to be a successful learning strategy in a variety of domains including dynamic mental model development. This investigation explored whether it was beneficial to construct a diagram for oneself or for another person when learning about the cardio-vascular system. It also explored if individual differences in spatial ability mediated this effect. Forty 18-22 yr olds studied text passages about the human circulatory system and then constructed diagrams containing information from these passages; twenty constructed diagrams under instructions to draw them to aid their own learning and twenty constructed the diagrams with the instructions to draw them for another (low knowledge) person. Results showed that subjects improved significantly from pre-test to post-test on measures of factual knowledge but that this improvement was equal in both conditions. Measures of mental model construction given at post-test also did not relate to drawing condition. However, drawing for others led to diagrams that were judged as significantly clearer, as containing more of the presented text, and which used more words. Furthermore, those with high spatial ability did not learn more than those with low spatial ability nor did it influence the drawings that students constructed. Finally, it was found that the quality of drawings was related to what students' learnt – those students who translated more written text gained greater factual knowledge and those students who drew more concrete diagrams developed deeper mental models (see Figure 1).

Why situation models are dynamic ? Some theoretical, empirical and pedagogical arguments
Isabelle Tapiero, University of Lyon 2, *France*

Current theories of text comprehension assume multi-level representations of a text and its content (Kintsch, 1988; Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983). Two levels that are usually distinguished are the semantic and the situational level (Fletcher & Chrysler, 1990; Tapiero, 1991). The semantic or textbase level includes both local and global processing, microstructure as well as macrostructure. Microprocessing involves the construction of a locally coherent propositional network (including referential, temporal and causal relations) called the textbase. The global structure of the text, or macrostructure, accounts for what we call the gist of a text. But, understanding a text requires representing what it is about (e.g., relations between the local and global facts to which the text refers) and goes beyond the semantic level of representation. Whereas the microstructure and macrostructure remain close to the textual representation, building

the situation model leads the reader to integrate his/her prior knowledge with the textual information. Therefore, situation-models building can be defined as being a function of several factors, such as the level of readers' prior knowledge, the type of texts, the nature of the relations between facts depicted in the texts, and the readers' goals or strategies before and during the reading. In that sense, it involves a dynamic aspect, each of the aforementioned factors being part of this dynamic. The goal of this paper is to present some theoretical, empirical and pedagogical arguments that bring into the fore how and why this dynamic takes place.

Understanding locomotion of fish from static and dynamic visualizations
Peter Gerjets, Knowledge Media Research Center, Tübingen, *Germany*
Katharina Scheiter, University of Tübingen, *Germany*
Birgit Imhof, Knowledge Media Research Center, Tübingen, *Germany*

Dynamic visual representations (e.g., computer-generated animations, digital video) are often hypothesized to support the construction of dynamic mental models more effectively than static visual representations (e.g., graphics, pictures). In our study we compared different types of static and dynamic visualizations with regard to their instructional potential to support the construction of dynamic mental models of complex processes in the Natural Sciences. For experimentation we used learning materials from marine biology on the complex dynamics of fish locomotion (i.e., movement patterns, hydrodynamic principles, evolutionary adaptation to habitats, and food patterns). To address the research question of whether dynamic representations are more apt than static representations to support the construction of dynamic mental models of fish locomotion we used dynamism as a first independent variable. We compared experimental conditions that contained dynamic representations of movement patterns (digital video, animations) to conditions that merely contained static representations of these movement patterns (i.e., multiple stills of key frames from the dynamic representations). As a second independent variable we manipulated the realism of the visualizations. We compared experimental conditions that contained realistic representations of movement patterns (digital video or sequences of stills, respectively) to conditions that contained schematic representations only (animations based on simple line drawings or sequences of key frames, respectively), resulting in a 2x2-design. 20 participants with low prior knowledge were assigned to each of the four conditions. Learning outcomes were measured by different tests that addressed the quality of the dynamic mental models constructed from the visualizations provided. Preliminary analyses of the data obtained up to now reveal an inferiority of highly realistic dynamic visualizations with regard to many content aspects of the dynamic mental model constructed by students.

Understanding the dynamic of a human desaster
Wolfgang Schnotz, University of Koblenz-Landau, *Germany*
Holger Horz, University of Koblenz-Landau, *Germany*
Thorsten Rasch, University of Koblenz-Landau, *Germany*
Chad Mortensen, California State University Chico, *USA*

Semantic memory includes generic knowledge about spatial configurations and dynamic temporal events as well as knowledge about causality and intentionality. It is generally assumed that these kinds of knowledge are implemented in the human mind in the form of cognitive schemata such as spatial and temporal (i.e. dynamic) schemata. Accordingly, the construction of dynamic mental models can be considered as the result of an interplay between these different kinds of cognitive schemata. In order to understand the interplay between these schemata in the construction of dynamic mental models, a study was performed in which 30 university students were required to

mentally integrate information from multiple external representations using different representational formats such as a text, a map and a time line graph into a dynamic mental model in order to understand the course of events of an accident. The various information sources (text, map, time line graph) conveyed different combinations of spatial and temporal relations as well as relations about causality and intentionality. The process of dynamic mental model construction was studied under different conditions. Besides spontaneous reading, participants had also to answer questions on different levels of a taxonomy of coherence formation. These questions required them to focus either on local coherence formation or on global coherence formation processes. Cognitive processes were monitored either by the registration of eye-movement or by using the thinking aloud method. Results indicate that participants depending on the kind of coherence formation requirements reveal significantly different patters of bottom-up directed perceptual processes as indicated by eye movements and of top-down directed cognitive processes as indicated by the verbal data of the thinking aloud procedure. Furthermore, there are also specific asymmetries between processing of spatial patterns and processing of temporal patterns.

L1
31 August 2007 11:00 - 12:20
Room: PP1
Poster Session

Poster session

Chair: **Christa van Kraayenoord,** The University of Queensland, *Australia*

Schools as differential environments: School quality and its influence on the development of intelligence
Michael Becker, Max Planck Institute for Human Development, *Germany*
Oliver Lüdtke, Max Planck Institute for Human Development, *Germany*
Ulrich Trautwein, Max Planck Institute for Human Development, *Germany*
Jürgen Baumert, Max Planck Institute for Human Development, *Germany*

The longitudinal study presented examines the influence of school quality on the development of psychometric intelligence. Several studies have shown that the duration of schooling influences the development of intelligence during childhood and adolescence (Ceci, 1991), but the influence of differences in school quality (e.g., instruction) is less well examined. Drawing on data obtained from a representative subsample of students in the BIJU Study on Learning Processes, Educational Careers, and Psychosocial Development in Adolescence and Young Adulthood (Baumert et al., 1996), intelligence gains in the academic track (Gymnasium) are compared with those observed in the other school tracks (low and intermediate vocational tracks). A non-verbal, figurative test assessing fluid intelligence was used as an indicator of intelligence. Relevant psychological and social background variables (crystallized intelligence, academic achievement, grades, etc.; parental SES, migration status, etc.) were also included in the analyses. We used propensity score matching (PSM) to control for selection bias, which is a major issue in observational, non-randomized studies. The PSM method was successfully implemented and indicates that results can only be generalized to part of the sample. For the participants who were successfully matched, a strong positive effect of higher school quality in the academic track was discerned.

Enhancement of thinking skills: Effects of three intervention methods
Maria Luisa Sanz de Acedo Lizarraga, Public University of Navarre, *Spain*
Maria Teresa Sanz de Acedo Baquedano, Public University of Navarre, *Spain*
Maria Cardelle-Elawar, Arizona State University West, *USA*

A study was carried out using as research subjects students of Compulsory Secondary Education, with the purpose of comparing the effectiveness of three intervention methods—Infusion method (IM), Instrumental Enrichment Program (IEP), and Conventional Method (CM)—to improve thinking skills, self-regulation of behavior, learning transfer, and academic achievement. There were 176 participants from one public center and two private one. Each one of the centers was randomly assigned to Experimental Group 1 (EG1), Experimental Group 2 (EG2), and Control Group (CG). In all the criteria variables, the best results were obtained with the infusion method. However, the students who received the IEP did not display significant differences in the variables of verbal and numerical reasoning, creativity, and academic achievement. Important scientific and educational implications of the studies are discussed.

Effects of web-based training exercises in academic writing
Antje Proske, TU Dresden, *Germany*
Susanne Narciss, TU Dresden, *Germany*

Academic writing is a complex task that involves a variety of cognitive and metacognitive activities. However, many university students perceive academic writing as an ill-defined task which, as a consequence, leads to feelings of incompetence and frustration. Thus, the purpose of the research presented here was to develop and evaluate interactive web-based training exercises to support students' acquisition of basic writing competences. The main concerns include the: (a) development of a psychologically sound computer-based writing environment for academic writing; and (b) empirical investigation of the effects of working with the writing environment on achievement and motivation. First, the development of the writing environment "escribo" is described. It is based on an integrative model of academic writing, which was derived from theoretical considerations and models of the writing process as well as text comprehension. This model identifies the demands of academic writing in detail. Therefore, it provides the basis for analysing empirical findings on strategies and techniques to master these demands. Consequently, empirically proven writing strategies were implemented into the writing environment. As a result, students receive cognitive and meta-cognitive support in their academic writing. Second, an empirical study using a delayed treatment design was carried out to determine the effects of the writing environment. Its results show that there is some evidence that working with the writing environment is superior to a situation without any support; in session 1, for example, students supported by "escribo" wrote texts with a better readability compared to students working without support. However, after composing texts with "escribo" students assessed the intrinsic value and their competence beliefs of writing lower than students of the comparison condition. Third, implications of these results will be discussed with regard to the restrictions and benefits of fostering basic competences of academic writing through interactive web-based training exercises.

"Please explain what the question is asking you for". The effects of task representation on question-answering activities
Raquel Cerdan, Catholic University of Valencia, *Spain*
Ramiro Gilabert, University of Valencia, *Spain*

The present study analyses the role of question encoding processes in question-answering success and its relation to students' previous comprehension level. Forty-seven secondary school students read two texts and answered ten comprehension questions, five belonging to each text. The reading and answering was performed using a software called Read&Answer. Only in one of the texts, students were asked to first explain in their own words what the question was asking them for and then answer. Results indicated that explaining questions favored only good comprehenders, whereas it hindered performance for poor comprehenders.

Executive functions and learning mathematics in 7-Year-Old Children
Sanne van der Ven, Utrecht University, *Netherlands*
Evelyn Kroesbergen, Utrecht University, *Netherlands*

Already at a young age, children show large individual differences in math proficiency. Several studies have shown that executive functions play a large role in math acquisition, but most studies treated executive functions as a whole. The aim of this study was to assess the role of the distinct executive functions in the mathematical development of twenty-six normally developing seven-year-old children who were learning addition over ten. Based on previous research, three executive

functions were expected to be found in these children: inhibition, shifting and updating. For each executive function, two tasks were administered and a principal component analysis was performed, which confirmed the existence of these three executive functions. The influence of each executive function on mathematical development was measured. Especially updating and shifting were found to be related to mathematical development, while inhibition only played a minor role. These results strengthen the notion that executive functions are important in mathematical development and that the different executive functions have distinct roles in this development. Furthermore, early assessment of executive functions can help identify children at risk for mathematical difficulties in an early stage.

Enhancing student creativity in Chinese writing through the systematic use of variation and invariance in teaching
Wai Ming Cheung, The University of Hong Kong, *Hong Kong*

This research reports an attempt to use the Learning Study approach which refers to the blending of the Japanese lesson study model and of design experiments to solve the problem of the apparent support of teachers on creativity enrichment. We aim to identify the gaps in teachers' knowledge of creativity in pedagogy, to boost teachers' awareness, enable them to develop their own skills and resources, and evaluate their effectiveness in enhancing students' creativity in Chinese writing. Four teachers and 137 students of four Primary three classes joined the target group and the Learning Study for one year. Teacher participants discerned the capability of writing creatively in lesson planning and then used the creative writing strategies developed in the learning study to teach writing skills of the student participants. Differences in the creativity scores among four Primary three classes in the target group were found even though they all derived from the same intended object of learning with the same lesson plan. These are linked to specific differences in the enacted object of learning. This is how the object of learning is handled, structured and presented in different classes in terms of different patterns of variation to generate many, different, and original ideas in Chinese writing. The Theory of Variation was employed as the framework to make sense of the relationship between what was happening in different classrooms and what the students gained from participating in the classroom events in terms of the lesson structure and the degree of simultaneity. This research has illustrated that the differences in learning outcomes of enhancing creativity in writing were to a significant extent associated with the teachers' awareness of the role of variation and invariance for learning as demonstrated in their way of conducting the lessons.

When collaborative learning becomes more efficient than individual learning
Femke Kirschner, Open University of the Netherlands, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*

Using cognitive load theory, this study considers the human cognitive architecture, specifically the limitations of the working memory capacity at the individual level, as an important reason to assign learning tasks to groups rather than to individuals. The basic assumption is that collaborative learning can only become more efficient than individual learning if the cognitive costs associated with learning the task plus the cognitive costs associated with the communication and coordination of the knowledge between the group members exceed the cognitive resources that an individual can supply. It is hypothesized that the more complex the task (i.e., the higher the intrinsic cognitive load), the more efficient it will become for individuals to collaborate with other individuals in a fashion that reduces this load. A randomized 2 (Cognitive Capacity: individual vs. group) x 3 (Task Complexity: low, medium, high) factorial design with repeated measures on the

latter factor is used to study the learning efficiency (Paas & Van Merriínboer, 1993) of 80 participants, either learning individually or as a member of a triad. Sweller and Chandler's (1994) method based on the number of interactive elements in a task is used to determine the task complexity or intrinsic cognitive load. The learning tasks are in the domain of Genetics. In the learning phase, participants have to solve a low, medium and high complexity task, and rate the amount of invested mental effort on a 9-point cognitive load scale (Paas, 1992). Video recordings are used for qualitative analysis of the groups' learning process. An individual transfer test and subjective ratings of mental effort in the test are used to calculate the learning efficiency. Data will be collected in December 2006.

Concept mapping for meaningful learning
Anita Habók, University of Szeged, *Hungary*

Learning is a very important component of our life, and it is impossible without life-long learning. The school should teach students must learning strategies, as these will help them organize the learning material. Concept maps are useful tools for promoting meaningful learning. The aim of the paper is the presentation of concept mapping in the context of elementary and secondary school. Three elementary and three secondary classes participated in the research presented. Subjects were administered two tests at the beginning and at the end of the developmental project, a Hungarian grammar test and an inductive reasoning test. The developmental program is imbedded in Hungarian grammar instruction. First the students had to create drawings of selected instructional texts, then to complete maps, and to draw maps alone at the end of the program. The presentation discusses the students' learning outcomes and development in concept mapping, grammar and inductive reasoning.

Beliefs about the functions of knowledge
Rozendaal Jeroen S., Leiden University, *Netherlands*
de Brabander Cornelis J., Leiden University, *Netherlands*
Martens Rob, Leiden University, *Netherlands*
Boekaerts Monique, Leiden University, *Netherlands*

De Brabander (1990; 2000) distinguishes between two categories of personal epistemology: beliefs about functions and beliefs about the structure of knowledge. The former refer to beliefs about important purposes of knowledge, the latter to beliefs that are related to the validity of knowledge (Rozendaal, de Brabander, & Minnaert, 2001). The object of almost all research on personal epistemology is beliefs about the structure of knowledge (Hofer & Pintrich, 1997). Research on beliefs about functions of knowledge is virtually absent (De Brabander, 2000; De Brabander & Rozendaal, in press). The aim of this study is to explore the dimensionality of beliefs about the functions of knowledge. Furthermore, we want to investigate whether these beliefs are related to interest and self-determination (Deci & Ryan, 1985) of students in social-constructivistic learning environments. In a small interview study, we gathered reflections about the functions of knowledge. From these interviews, we distilled ten propositions about the function of knowledge. We ask 250 freshmen to order these propositions in terms of importance. They also evaluate each session in terms of interest and self-determination. By means of multidimensional unfolding, we will explore the dimensions that explain the variances in these rank orders. Furthermore, judgments of knowledge functions are related to data on interest and self-determination. At the very moment data collection is well underway and will be completed in March of 2007. This study attempts to increase insight in beliefs about the function of knowledge as a relevant, but virtually neglected category of analysis in research on personal epistemology.

L2

31 August 2007 11:00 - 12:20
Room: PP2
Poster Session

Poster session

Chair: **Marcel Crahay,** Universite de Geneve, *Switzerland*

Young children's understanding of illness causality: A role of vital power in recovery from illness
Kayoko Inagaki, Chiba University, *Japan*
Yoko Oura, Niigata University, *Japan*

The present study examined young children's and adults' understanding of recovery from the common cold from a vitalistic biological perspective. Twenty-four 4-year-olds (Mean age, 4; 10) and 24 5-year-olds (5; 9) and 24 college students were presented with two sick protagonists, who were allegedly different in terms of biological (e.g., eats a lot of vegetables vs. few vegetables), psychological/sympathetic (e.g., receives visits from healthy friends for encouragement vs. receives no visits from friends), or moral (e.g., lies often vs. does not lies) factors in their daily activities, including the time they fell ill, and were asked which of the two would recover more quickly from the illness. Next, the participants were asked to indicate the relative importance to a quicker recovery of the biological vs. psychological/sympathetic factors, the biological vs. moral factors, and the psychological/sympathetic vs. the moral. The results indicated that, like adults, the children recognized that not only biological vital power but also "psychological" vital power plays a role in the recovery from illness, and that the morally good behaviors are less important than the other two.

University lecturers' beliefs about how examinations help students learn
Kathy Harrington, London Metropolitan University, *United Kingdom*
Lin Norton, Liverpool Hope University, *United Kingdom*
Bill Norton, Liverpool Hope University, *United Kingdom*
Lee Shannon, Liverpool Hope University, *United Kingdom*
Peter Reddy, Aston University, *United Kingdom*
James Elander, Thames Valley University, *United Kingdom*

Aim This paper reports on findings from a substantial body of research carried out at four universities in the UK analysing lecturers' beliefs about examinations. The research aim was to explore lecturers' beliefs about using traditional exams and how this aligned to their pedagogical beliefs. Method The research has been carried out in two phases. In phase 1 in-depth semi-structured interviews were conducted with 29 lecturers from seven disciplines in two universities in the UK. Thematic analysis of the interview transcripts suggested that most lecturers were conscious of the need to align assessment to learning outcomes and used or wished to use a range of appropriate methods. There was less unanimity about the pedagogical value of exams. In phase 2, an electronic questionnaire was designed built on items from the interview study and from the literature, to explore more widely lecturers' beliefs about how exams relate to student learning. This questionnaire has been circulated to all lecturers at four universities in the UK. Outcomes These data will be explored using inferential statistics to identify patterns of lecturers' beliefs using a broad taxonomy framework for understanding some of the constraints that prevent lecturers from changing their methods of assessment. Significance The findings from both phases

of this two-year study will be discussed in the context of how exams can be used most effectively to develop new potentials for learning.

Impact of practice analysis group on teacher beliefs, attitudes and interventions toward students with ADHD
Catherine Lanaris, Universite du Quebec en Outaouais, *Canada*
Line Masse, Universite du Quebec a Trois-Rivieres, *Canada*

Attention deficit disorder with or without hyperactivity (ADHD) is the behavior disorder that is most frequent in school age children. These children are often at a very high risk for academic underachievement. Teachers have generally little knowledge about ADHD, and educational practices recommended for them. Many have beliefs and values that go against the recommended practices. Teachers' training regarding ADHD turns out to be a good way to improve practices with ADHD students. However, when teachers' training is limited to workshop, there is little reinvestment in their classroom. In an action-research, we have developed a support service for helping teachers to renew their practices toward ADHD students. This service includes a training workshop on ADHD followed by practice analysis group for teachers having at least one ADHD student integrated in their classroom. These groups play a role of supervision and support for participants. Two tools were particularly used in the meetings: learning diary and group problem solving process. The diary is characterized by a deliberated reflexive process on consigned data on a problematic situation with ADHD student in order to better understand it, and to bring out principles or solutions to apply in the future. To evaluate the impact of this service, we used a qualitative approach to have a more in depth perception of the participants' experience. Semi-structured interviews were conducted with all the teachers participating in the practice analysis group (N =18). A systematic approach was used for the data analysis, and the work environment of ATLAS-ti was used. Many positive impacts emerge from the data, among others: a better knowledge and understanding of ADHD students' problematic and practices to meet their needs, the establishment of cooperation between the teachers who support each other to better understand the problematic of a particular student or to find solutions.

Measuring subordinates' evaluations on their superior's emotional leadership with LCCQ
Petri Nokelainen, University of Tampere, *Finland*
Pekka Ruohotie, University of Tampere, *Finland*

This paper presents an 18-item self-rating Likert-scale Leadership Competencies and Characteristics questionnaire (LCCQ) that operationalises Goleman, Boyatzis and McKee's (2002) four domains of Emotional Intelligence (EI) with eighteen characteristics. The sample consists of 682 adult employees of several Finnish companies, one vocational institution and one vocational high school. First, the eighteen items of the B part of the LCCQ measuring subordinates' evaluations on their superior's emotional leadership were analysed by mean values and standard deviations. Second, the variable structure was examined with Bayesian dependency modeling (BDM, Myllymäki, Silander, Tirri & Uronen, 2002). Third, eighteen emotional leadership items were correlated with four items from the A part of the LCCQ measuring (1) decision making skills, (2) leadership skills, (3) planning and organizing skills, and (4) human relations skills. Investigation of subordinate's evaluations showed that the target organization's superiors had quite sound sense of their self-worth and capabilities. They were also able to read currents, decision networks, and politics at the organizational level, recognize and meet follower, client or customer needs, keep disruptive emotions and impulses under control, and see the upside in the events. The BDM results showed that the theoretical structure of EI is present at least in component level in

this domain. Further, the visual inspection of the Bayesian dependency network showed that all four EI domains were present in the model derived from the empirical sample. The results of correlational analysis revealed low correlations with decision-making and planning and organizational skills, and high correlations between leadership and human relations skills, as expected.

Psychological profile of at-risk students in Malaysian secondary schools
Habibah Elias, Universiti Putra Malaysia, *Malaysia*
Rahil Mahyuddin, Universiti Putra Malaysia, *Malaysia*
Samsilah Roslan, Universiti Putra Malaysia, *Malaysia*
Nooreen Noordin, Universiti Putra Malaysia, *Malaysia*
Maria Chong, Universiti Putra Malaysia, *Malaysia*
Mohd. Sofian Omar Fauzee, Universiti Putra Malaysia, *Malaysia*

The purpose of this study was to determine the profile of at risk students in terms of psychological traits (Intelligence Quotient, achievement motivation, self-efficacy, emotional intelligence and self esteem), sosio-economic status and family background. At risk students in this study are confined to students who are low in academic performance and with discipline problems. The sample comprised of 1,473 Form Four students categorized as performing and non performing (at risk) students. The two groups of students were sampled from schools identified by the Ministry of Education according to six zones (North, Central, South, East, Sabah and Sarawak). The instruments used in this study are questionnaires for demographic information,achievement motivation, self-efficacy,self-esteem,emotional intelligence and intelligence test. The findings of the study show that at risk students have an average equivalent IQ of 98.4 compared to the performing students with an average equivalent IQ of 115.8. The achievement motivation of at risk students was moderately high with a score of 3.04 and SD=.34. In terms of mathematics self-efficacy, the mean was quite low (mean=2.81, SD=.43) indicating that the respondents do not perceive themselves as competent in mathematics. The mean of self-efficacy for English language was also low (mean=2.84, SD=.46). This shows that most of the at risk students do not have confidence in their competency in the English language. Research findings also show that the overall mean score for emotional quotient which is represented by emotional literacy (EL) of 688 low achievers is 57.67 indicating that low achievers obtain a low level of EL. On self-esteem, overall the respondents obtained a mean score of 2.94, SD=.34 which is closely associated with low self esteem.

Do you have a mind? Don't worry. You will be alive: Children's moral judgements about killing
Dimitris Pnevmatikos, University of Western Macedonia, *Greece*
Anastasia Konorta, University of Western Macedonia, *Greece*

The aim of the study was to investigate the young children's moral judgments in case a human being terminates, for different reasons the life of other organisms, which they differ according to our judgements about their mind. The study was inspired from the Dennett's assumption that the classification of a specie as mind-heaver has moral consequences when someone kills a case which belongs to this specie. Human protagonists appeared in scenarios to kill other humans, big / medium and small animals for six different reasons. In the study participated 150 children, 4-, 6-, 8-, 10- and 12-year-old, in equal number of males and females in each age group, each of whom interviewed individually in one session lasting approximately 10 min. A questionnaire of 24 items addressed to participants. Principle component analysis revealed three factors on the basis of the reason the protagonist terminated the life of other animals and one factor where the protagonist

killed human beings for different reasons. Results showed that the younger children (4- & 6-year-old) judged all the conditions of killing as very immoral/bad action. The elementary school children's judgements, however, are differentiated mainly on the basis of the reason someone kills other humans or animals. Moreover, the size of the animal and consequently the mind may has, is a reason to explain why people do not feel guilty when they kill small animals.

Peer relationships, school liking, and attitude toward learning in the early years of schooling
Nicole Royer, Universite du Quebec a Trois-Rivieres, *Canada*

This report examines linkages between peer relationships, school liking and attitude toward learning in the early elementary grades. 264 children (68 boys and 58 girls) and 13 teachers took part in the study. All children were Caucasians. Participants included 126 first graders, 80 second graders and 61 third graders. Results showed that boys' school liking was not correlated with either peer acceptance or mutual friendships Peer acceptance and mutual friendships were strongly associated with teachers' assessment of attitude toward learning. We conclude that peer relationships may be viewed as a potential antecedent of children's school adjustment. This finding supports the view that interactive pedagogical strategies, in focusing on collective projects and team work, may facilitate school adaptation.

The implementation of a relational approach in an early years setting: A case study
Jennifer Colwell, University of Brighton, *United Kingdom*

Utilising both qualitative and quantitative methodologies an in-depth case study was conducted using Action Research methods. Data was collected both before and following practitioner 'training' in the promotion of and the implementation of a relational approach. The training and initial implementation were also observed. Initial findings indicate that whilst the relational programme impacted significantly on children, in terms of increased social networks and increased on-task participation, the change in the attitudes and practice of key staff was essential to the success of the intervention and it was this change which impacted on the children much more than the intervention. Analysis is currently considering the impact of the implementation of an initiative which involves on-going practitioner support and how this impacts on professional development and professional identity.

L3
31 August 2007 11:00 - 12:20
Room: PP3
Poster Session

Poster session

Chair: **Edina Caprez-Krompák,** University of Zurich, *Switzerland*

Teacher education accreditation in Turkey: Adaptation of European and American models in an EU candidate nation
Gary M. Grossman, Arizona State University, *USA*
Margaret K. Sands, Bilkent University, *Turkey*
Barbara Brittingham, New England Association of Schools and Colleges, *USA*

Since its founding eight decades ago, Turkey has emphasized education as a key to economic, social and political development. For fully half of that time, it has aspired to membership in the European community. In this context, Turkey has made a major effort to upgrade and modernize the Turkish educational system. One of those reforms, perhaps the one most crucial to the long-term effectiveness of many of the other efforts in education, has been a transformation of the nation's approach to training teachers. These reforms have included curriculum reform, restructuring university faculties of education, and the development of accreditation processes to evaluate the quality of teacher training programs. With regard to accreditation, these efforts have been largely concerned with adapting foreign models to the Turkish situation. It has now been six years since the completion of both the World Bank-funded National Education Development Project (NEDP) and its parallel reform in requiring all Turkish faculties of education to attend to common criteria for training teachers. In 2003-2004, a major study of the effects of the reforms of Turkish teacher education was conducted, one portion of which included an evaluation of the progress toward implementing accreditation. This paper examines the effectiveness of this recent effort in teacher education reform in Turkey, specifically efforts to implement European and American approaches to accreditation, from the point-of-view of teacher educators . It evaluates factors that are drawn from literature in an effort to define the bases of attitude differences in the Turkish teacher education community, utilizing both quantitative and qualitative data analytic formats. It also discusses educational reform efforts in the Turkish educational system with specific reference to Turkey's EU aspirations. Finally, it examines the theoretical implications for the modernization of teacher education in an institutional context, particularly as it concerns 'importing' approaches from abroad.

Evaluation of structured knowledge of a test sample by using concept maps
Iris Trojahner, Dresden University of Technology, *Germany*
Bärbel Fürstenau, Dresden University of Technology, *Germany*

An important aspect of the ability to successfully meet complex demands in a particular context is a structured knowledge base. Still, what persons know cannot be directly assessed by an external observer. It is therefore required to apply adequate psychological data collection and evaluation methods. Suitable methods for this purpose are concept maps, because their form of data representation corresponds with the characterisation of knowledge as relational system and agrees with current models of the semantic memory. The technique of concept mapping is not new at all. Amongst others it is used for assessing and evaluating data, especially structured knowledge of

test persons. Concerning the evaluation it is an obvious problem that the results gained almost exclusively refer to individual test persons. It seems rather difficult to represent and evaluate the structured knowledge of a test sample. This is especially true for qualitative statements. To face this problem, modal and prototypical concept maps as methods for data evaluation will be introduced. Modal concept maps are composed of the most commonly shared knowledge of a group of test persons. A critical point is that they have not been developed in total by any of the test persons. Therefore, it might be more useful and coherent with the original data, to represent the structured knowledge of a sample by identifying a concept map for analysis which has been created by one of the test persons, a so-called prototypical concept map. A prototypical concept map is required to come closest to all individual concept maps regarding content and structure. Both, modal and prototypical concept maps will be assessed concerning their potentiality for qualitatively representing a test sample.

Student (non-)engagement with seen examination questions: a case study
Nicola Reimann, Northumbria University, *United Kingdom*

This case study explores students' perceptions of seen examination questions about topics not covered by the formal curriculum of a final year Economics module and of the associated group support sessions. Eight semi-structured interviews with a total of thirteen students were analysed for this paper; they are part of a larger data set collected for a large UK-wide project investigating teaching-learning environments in undergraduate higher education. Take-up for the seen examination questions was low and the students who did not answer a seen question tended to make workload considerations as well as concerns about group work for assessment purposes responsible for their decision. Some of them still engaged in independent group work, and despite not participating in the group sessions which were part of the formal curriculum, a few students researched a seen question in conjunction with trusted fellow students or on their own. While the students who undertook this type of independent preparation appeared to act very autonomously, the lack of participation in the group sessions was regarded as disappointing by the lecturer. One of the issues associated with the formal preparation process was the absence of detailed guidance and feedback as this would have compromised the summative function of the examination. The students who answered a seen question developed and/or applied independent learning skills and enjoyed the freedom which the seen exam questions provided, but other students were critical of the way in which their lecturers were trying to regulate and control their autonomy. Contrary to expectations, learners taking a strategic approach to the module were not attracted by the seen questions. The uncertainty of an unfamiliar assessment format and the prospect of undertaking unguided independent research and group work were perceived as involving more risks than taking a familiar unseen examination.

Changing assessment conceptions and practices based on the PISA project. Does it influence teaching practices
Carles Monereo, Autonomous University of Barcelona, *Spain*
Montserrat Castello, Ramon Llull University of Barcelona, *Spain*
David Duran, Autonomous University of Barcelona, *Spain*

The PISA Project has had a strong repercussion in all countries were it has been implemented, especially in those where the scores obtained are beneath the European average, as is the case of Spain. Unfortunately, at least in our country, this repercussion has not exceeded the limits of debate in public media and little is being done to change educational practices so as to obtain better results in the next assessment. With this research we try to demonstrate that the PISA items

can not only be useful to evaluate the progression of a given educational system every four years. The epistemological and psycho-educational bases of PISA can also be helpful to promote changes in the educational conceptions, discourses, and practices regarding both assessment and instructional practices of Secondary Education teachers when they are invited to participate in research process as partners. Our starting point is a case study constituted by eight secondary school teachers, involved in a two-year long research. During this period we negotiated with them what we called a Guide for Task analysis from the PISA Perspective (GTAPISA). To analyse the changes we used a consensual system of categories, collecting these dimensions: Degree of authenticity of assessment tasks and class sessions; degree of complexity of the contents included in the assessment task, and degree of coherence and promotion of learning autonomy. Results allow us to confirm our objectives. Indeed, the teachers' incorporation as research partners facilitated the change in their conceptions from a view oriented to "Assessment of Learning" to a view oriented to "Assessment for Learning". On the other hand, the study shows that the counselling-action process also promotes evident changes in the assessment tasks elaborated and, to a lesser extent, in the Teaching Units development.

Studying teachers' reflections on their work; articulating what is said about what is done.
Juan Jose Mena Marcos, University of Salamanca, *Spain*
Emilio Sanchez, University of Salamanca, *Spain*
Harm H. Tillema, Leiden University, *Netherlands*

Teachers' written reflections on their work, which reported on a change in their practice, were the object of this study. We focused on teachers' articulation of their plans and actions in teacher journals to inform other teachers about their work. The study's aim is: (1) to describe how teacher reflect, in a non-framed way, on their own practice, and (2) to appraise the quality of such reflections. Articulation of reflection is interpreted in two ways, as: a) complete, that is, whether it includes relevant components of teacher action research, and b) recursive, that is, whether the written account gives evidence of an integrated cyclical process of review - in sufficient detail - to justify a change of practice. The results of our study of 49 written reflections show that teachers do not work with all components identified in current reflective models (i.e. consisting of: providing clear problem definition, searching for evidence, planning for change, and reviewing plans). Also, many teachers did not appraise or look back on their actions in a reviewing way. Their appraisals of plans and solutions tended to be ambiguous, general, and peripheral. The data lead us to be cautious about the prominence of reflective thinking in teachers' written accounts of their practice.

Language and Identities in School Arenas. LISA-21
Oliver St. John, Department of Education, Örebro University, *Sweden*
Karin Allard, Department of Education, Örebro University, *Sweden*

"Language and Identities in School Arenas" (LISA 21) is a new ethnographically inspired project funded by the Swedish Research Council (VR) and is situated at the KKOM-DS research group at Örebro University. The primary aim of Project LISA 21 is to study how plurilingual and multicultural resources of Swedish school arenas are reflected and negotiated in different types of language education at the beginning of the 21st century. The project is particularly interested in the way members of different educational settings conceptualise plurilingualism and multiculturalism and how such conceptions frame and affect language education and meaning-making processes. LISA 21 aims to explicitly focus on both everyday life and textual practices that (co)constitute language education in the following four types of secondary school arenas: Schools with an ethnically Swedish homogenous population, Schools for the Deaf, English profile schools and

Schools with a plurilingual/multicultural membership. Taking sociocultural, postcolonial and pragmatist theoretical frameworks as points of departure and taking research conducted within different fields such as communication-culture-identities and ethnicity research, language related educational research and the academic areas known as Disability Studies and Deaf Studies, the project aims to create new empirical, analytical and theoretical intersections. It is hoped that the results will contribute towards more refined knowledge about the similarities, differences and complexities of linguistic and culturally pluralistic language education in different secondary school learning environments. Two pilot studies in project partner schools will be conducted in the spring. The results of these will hopefully provide crucial orientation for fine-tuning the project's analytical framework and approach. These preliminary findings will be shared and discussed in this poster presentation.

Contested multicultural identities in post 9/11 Australia. Challenges and opportunities for the education sector

Nina Burridge, University of Technology, Sydney, *Australia*

This paper investigates the challenges and opportunities teachers and educators face working with ethno-cultural diverse communities in the increasingly complex post 9/11 environment in Australia schools. In providing an historical back drop to the findings, the paper posits that despite the fact that Australian leaders boast one of the most successful experiments in multiculturalism post world war two, current concerns about ethno-cultural diversity have deep roots in the nations' race-relations history. It is clear that Australians views of multiculturalism are complex and multi-layered. The paper reports on case study research conducted in five secondary schools in the greater metropolitan area of Sydney, Australia. The schools are located in different geographic areas with different ethno-cultural compositions. The paper will analyse student and teacher understandings of ethno-cultural diversity issues and their manifestations in the classroom and within the schools' neighbourhood and discuss the challenges and opportunities for teachers and teacher educators in dealing with the increasingly complex environments in which schools operate. The findings affirm that the challenges for teachers and teacher educators are to steer a balanced course between competing policy agendas so that students from ethnically and socio-economically diverse backgrounds are not further disadvantaged in a 'one size fits all' education system. This is a particular challenge when the research suggests that teachers often inhabit a socio-cultural world which has more in common with monoculturalism than the culturally diverse world of the students they teach. The challenges then become ones of providing the resources and professional training for all our teachers, including our teacher education students, to better understand the pedagogical issues surrounding the links between culture, cultural maintenance and improved educational outcomes for students from ethno-cultural diverse backgrounds.

Teachers and parents in a multicultural environment: do they have the same representations of education and pupils?

Gregory Voz, University of Luxembourg, *Luxembourg*

Based on ongoing action-research in a multicultural school context in the French Community of Belgium, the present study aims to look at differences and similarities of representations held by native and immigrant groups of people. We will investigate whether the representations held by the different school actors are similar enough to build a consensus for an action for better schooling. To prepare the intervention on school-family communication, we will respond to two research questions: 1. Which variables explain the similarities or the differences in representations held by the groups: status (teacher/parent), nationality, age, schooling history, or other factors? 2.

Which actors are nearest in their representations and which ones are more divergent? We used questionnaires or interviews with parents (144 natives and 68 immigrants) and professionals (29) from a school in a multicultural context and gathered descriptive data and freely associated expressions to explore their representations of schooling and pupils. After clustering and a factor analysis of the results, we plan to advise on improvements to family-school communication. Empirically, we have two possibilities: either there are distinct representations held by the different groups corresponding to cultural or other variables, or the representations held by individual persons are not predominantly characterised by the different groups corresponding to cultural or other variables. These results will be available by the date of the conference. In each case we will propose some advice to help schools or institutions in a multicultural environment to understand their situations and have more information about their heterogeneous publics' expectations. The dissemination of the results of the study could also contribute to reducing detrimental prejudices, particularly on underprivileged groups.

Mathematics teachers' attitudes and practices: Is there a difference according to students' socioeconomic environment?

Anne Leblond, University of Montreal, *Canada*
Julie Bergeron , University of Montreal, *Canada*
Roch Chouinard , University of Montreal, *Canada*

Abstract The aim of the present study was to examine the hypothesis according to which teachers' attitudes and pedagogical practices differ depending on their students' socioeconomic status. Sixty-three 9th grade mathematics teachers answered a questionnaire concerning their attitudes about their students, their profession and their pedagogical practices. Some teachers were working in low socioeconomic environments (n = 36) and others were working in high socioeconomic environments (n = 27). Data were collected with a self-reported questionnaire including several scales: professional satisfaction, opinions on school success, pedagogical and assessment practices. Data were analysed with multivariate analyses of variance (MANOVA) in which the attitudes and pedagogical practices were the dependent variables and the socioeconomic status (SES) of the school environment was the independent factor. Results indicated that, in general, teachers' attitudes and practices did not vary much according to their school SES. However, some attitudes and practices were distinct between the two groups. Actually, teachers working in low SES environments mentioned that they compare their students on a performance basis more than teachers in high SES environments. Moreover, they use more exam-type evaluations in their pedagogical practices and perceive more socio-economic constraints in their students' environment than their colleagues from more privileged environments. Thus, teachers' formation programs should help them to better differentiate their pedagogical strategies according to their school SES.

L4
31 August 2007 11:00 - 12:20
Room: PP4
Poster Session

Poster session

Chair: **Eleftheria N. Gonida,** Aristotle University of Thessaloniki, *Greece*

Observation of parent-child interaction in kindergarten as a tool for child assessment
Amos Fleischmann, Achva Coll. of Education, *Israel*
Alicia Davidovsky, Derby University, *Israel*

Utilization of a quantitative observation in the kindergarten: assessment of the interaction between students and their parents and the effect of an early intervention. Parental involvement is of utmost importance to the functioning of children in kindergarten. The present study tested the possibility that observation of parent-child interaction during the time the parent brought the child to the kindergarten could be used as an assessment tool to learn about the child. . The current study was conducted in three kindergartens that were characterized by the diversity of their populations. Two research tools were developed: a Likert-type questionnaire for the assessment and diagnosis of the parents' behavior towards the child and the child's scholastic achievement; and an observation format for the assessment and diagnosis of the parent, the child and the parent-child interaction upon arriving at the kindergarten. A significant correlation was found in the Pearson coefficient (0.69) between the total number of quantitative observations and the total number of questionnaires to the kindergarten teachers, between the different parts of the questionnaire and the different parts of the observation. The averages of the observations and questionnaires of groups of children and parents whose children had undergone educational and psychological intervention were higher than those of the groups of children and parents who had not undergone such intervention One of the major challenges to the educational system is the narrowing of the gap in scholastic achievement of children from different socio-economic levels. Children who were diagnosed and given educational and psychological intervention that included the children and their parents showed a higher level of achievement. It seems that an extremely short quantitative observation in which the parent-child interaction is assessed can be used as an additional tool in the possession of kindergarten teachers to diagnose children.

Learning And Study Strategies Inventory : a preliminary study of italian validation
Maria D'Alessio, University of Rome La Sapienza, *Italy*
Carlo Di Chiacchio, University of Rome La Sapienza, *Italy*

Learning And Study Strategies Inventory (LASSI), college version (Weinstein, Schulte, Palmer, 1987, 2002) is a test measuring ten dimensions regarding cognition, motivation and emotion during study activities. Starting from the end of 80s, numerous studies have confirmed its validity both on psychometric and applicative ground (e.g. Olaussen & Bråten, 1998; Albaili, 1997; Hewlett, Boonstra, Bell, Zumbo, 2000). In Italy there are not many standardised instruments evaluating learning strategies in university population and, most of them, are within long batteries measuring several constructs. Therefore, the aim of this study was to give a preliminary contribution to the Italian validation of LASSI. Research objectives were to analyse the psychometric properties of the scales, to explore factor structure,to determine the discriminative power of the test comparing groups of students with different achievement.The main results

showed that all the ten scales were unidimensional and with Chronbach's Alpha acceptable considering the number of items for each scale (min Alpha .64 for Motivation; max Alpha .81 for Time Management and Anxiety).

Fostering literacy in young children: peer interaction during pretend play
Esther Vardi-Rath, Kaye College of Education, *Israel*
Tamar Eylon, Kaye College of Education, *Israel*
Teresa Lewin, Kaye College of Education, *Israel*
Zehava Cohen, Kaye College of Education, *Israel*
Hadassah Aillenberg, Kaye College of Education, *Israel*

This research deals with the discourse of young children during peer interaction in pretend play in the wake of reading stories and examining the relation between the characteristics of that discourse and the children's literacy skills. The purpose of this study is to describe children's negotiations in developing their play and the way children perform the transformation in order to construct their imaginary activity. The data were collected in Kindergartens and first and second grades. The pre-service teacher read a story to a group of four or five children and thereafter encouraged them to play it. Discourse analysis was carried out on the basis of a coding scheme designed to categorize thirty transcripts. The findings show that children are capable of collaborative negotiation in peer interaction concerning the play frame while improvising and proposing innovative ideas. In doing so, they often need to make symbolic representation according to the requirement of the particular plot (role, artifacts, scenario, and so on). A quantitative analysis shows that most of the children's negotiations takes place in a "meta-play" domain and are about artifacts and role-taking. The performance of symbolic representation (transformation) appears in two phases: the planning and the acting out of the transformation. A considerable portion of the representational content of the transformations is devoted to characters in the story. Looking at the representational medium of transformation, various means of symbolic representation can be seen: verbal statement, expression by gesture, use of artifacts and the use of the characters' language in the story. To sum up, children's peer interaction during pretend play is an activity with great potential for social and cognitive learning, and can be an opportunity to foster literacy skills, such as negotiations and symbolic representation.

The importance of preschool quality for early predictors of future school success
Susanne Ebert, Otto-Friedrich-Universität Bamberg; BiKS Projekt, *Germany*
Minja Dubowy, Otto-Friedrich-Universität Bamberg; BiKS Projekt, *Germany*
Jutta von Maurice, Otto-Friedrich-Universität Bamberg; BiKS Projekt, *Germany*
Hans-Günter Rossbach, Otto-Friedrich-Universität Bamberg; BiKS Projekt, *Germany*
Sabine Weinert, Otto-Friedrich-Universität Bamberg; BiKS Projekt, *Germany*

Against the background that advancements in preschool support children's later success in school, the presentation focuses on the importance of different aspects of preschool quality for preschoolers' performance on tasks that are known to measure specific predictors for future success in school. The research is part of a more comprehensive German longitudinal project studying educational processes, competence development and selection decisions in preschool and primary school age children (BiKS, Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vor- und Grundschulalter). In our presentation a subgroup of 126 children of the BiKS-3-8 study is selected to explore the interrelation between more general compared to more specific measures of preschool quality and skill acquisition. Account is given to measurement point 3 when children are between 4;6 and 5;2 years of age.

Effects of implementing a relational approach into English pre-school classrooms; changes in collaborative activity, inclusion and understanding
Peter Kutnick, King's College London, University of London, *United Kingdom*
Jen Colwell, University of Brighton, *United Kingdom*
Julie Canavan, University of Brighton, *United Kingdom*

Effective early education is associated with higher levels of educational achievement and social inclusion. While quantitative expansion of early education for young children has taken place, few studies focus on the quality of pre-school interpersonal interactions and associate these with achievement and inclusion; a social pedagogy of the pre-school. This study reports on a second phase (of a two-phase study) concerning the need for and implementation of a relational approach in classrooms to support social development and inclusion. (The first phase already showed distinct social pedagogic worlds in teacher- and child-led groupings, with child-led groups demonstrating a high degree of social exclusion, and minimal classroom activities that promote/support collaboration in learning). The second phase used an action research method that integrated relational activities within teachers' pedagogic approaches in 15 pre-school classrooms. Pre- and post-measures of classroom activity drew upon classroom mapping, reflective rating scales, sociometric scales and teacher interviews were used to assess change over a school year. Findings showed inclusive restructuring of teacher- and child-led learning groups, enhanced/inclusive choice of play/work mates by children, increased collaborative practices by teachers and children and greater appreciation of the role of relational activities within the curriculum by early childhood educators.

A case study of teacher, student, instructional design and system filters impacting on the research-practice relationship
Rosalind Murray-Harvey, Flinders University, *Australia*
Helen Askell-Williams, Flinders University, *Australia*
Michael J Lawson, Flinders University, *Australia*

This paper focuses on a critical teaching-learning issue: the relationship between research into effective teaching and learning and the reality of classroom practice. Our research aimed to identify key features of teaching practices in the implementation of the Mind Matters curriculum resource on Understanding Mental Illness (UMI). The UMI curriculum was developed by an external body set up to advance the national policy agenda on mental health. This curriculum design model may be vulnerable to disjunctions between the needs of the policy makers, curriculum designers and contemporary learning and teaching research. Further, the curriculum was implemented by teachers and processed by students in ways that might also diverge from ways that contemporary theories of learning and teaching suggest are effective. Participants were teachers, students, school administrators and a teacher reference group (TRG). The study adopted a case-study approach and mixed methods to analyze data from questionnaires, interviews, classroom observations and proceeding of the TRG workshop. Our research implicates broad sources that Bransford et al (2000) identify as mediating the impact of research on classroom practice. We identified a range of filters that were found to intervene between teaching-learning research and the implementation of the UMI module in classrooms, namely: (1) mental models of teaching and learning that inform external curriculum design; (2) mental models of teaching and learning that inform teachers' curriculum interpretation; (3) the preferred teaching practices that guide teachers' enactment of instructional designs; (4) students' knowledge of learning and of themselves as learners; and (5) the ways that new curriculum initiatives are positioned in educational systems. This research highlights the importance of investigating how educational

theory is represented in the authentic setting of classrooms and has implications for dissemination and uptake of research by curriculum designers and classroom practitioners.

Student thesaurus role in instruction process
Semion Sheraizin, Collage of Management, *Israel*

In this paper we consider a student cognition dependence on its thesaurus, a pre- existing knowledge. We suppose a student instruction as a process of a knowledge transmission and its reception by a student. An instructor performs a message of knowledge (semantic coding) in accordance with a student thesaurus and student's cognition. A message discrepancy with a student thesaurus results in an information loss and characterizes an inefficiency of a training process. We created the following propositions regarding to a coding of cognitive information: 1) a semantic coding is defined purpose; 2) a message after semantic coding is characterized by redundancy value which is increased for group of students with different thesaurus; 3) message source efficiency depends on a message form which defines a student thesaurus completion. The propositions application can be effective for a cognition optimization for both the student personal and group instruction.

How do educational reforms in the field of teaching and learning (NOT…) happen?
Adi Ben David, The Heberew University of Jerusalem, *Israel*
Anat Zohar, Israel Ministry of Education, *Israel*

Which barriers and what resources can be identified in current efforts to reform ways of teaching and learning in schools? Using a case study approach this presentation describes the insights of a former university professor who had recently moved to a senior government position. Data analysis identifies several barriers to current reform efforts (e.g., rapid political changes or objections of teachers' unions) and several resources that can assist such efforts (e.g., despair of current state of schools or remnants from previous reforms). The presentation will present a plan for reform that would take these insights into consideration..

L5
31 August 2007 11:00 - 12:20
Room: PP5
Poster Session

Poster session

Chair: **Maria Cardelle-Elawar,** Arizona State University - West Campus, *USA*

Do I feel good? Why?
Vera Monteiro, Intituto Superior de Psicologia Aplicada - ISPA, *Portugal*
Lourdes Mata, Instituto Superior de Psicologia Aplicada, *Portugal*

In this study we wanted to establish the psychometric properties of the motivational scale of Intrinsic versus Extrinsic orientation in the classroom of Harter (1980) for the Portuguese population and analyse the motivational profiles of Portuguese students from grades 6 to 12. We attempt to delineate different components on this construct. Our second goal was to examine this components of motivation within a developmental framework and within a given developmental

level. Our third goal was to relate the motivational orientation and perceived competences. The two scales were individually administrated to Portuguese students from sixth trough twelfth grade. We used to evaluate the self-concept, the self-perception profile for adolescents of Harter (1988). This scale provides a profile of student's perceived competence in different subscales: competence in school, social competence with peers, physical competence in sports, behaviour, physical appearance and general self-worth. To evaluate the motivation for learning we used the scale of Intrinsic versus Extrinsic orientation in the classroom of Harter (1980). This scale taps a student's intrinsic versus extrinsic orientation toward learning and mastery in classroom. Five separate dimensions are defined: challenge curiosity/interest, mastery, judgement and criteria for success/failure. The reliability and factorial validity of the scale of Intrinsic versus Extrinsic orientation in the classroom have been adequately demonstrated. Developmental data revealed that across grades 6-9 there is a change from intrinsic to extrinsic on the motivational factor. Across grades 10-12 we verified a tendency for the opposite. On the cognitive-informative factor there is a change from extrinsic to intrinsic, across grades 6-12. We also verified strong correlations between some subscales of self-perception (specially academic self-concept)and the different dimensions of the motivation.

Activities, apreciation, and abstraction: Secondary school mathematics teachers' beliefs about teaching and learning geometry
Brenda Strassfeld, NYU/University of Plymouth, *USA*

This poster focuses on my journey through my doctoral research: investigating high school mathematics teachers' beliefs about teaching and learning geometry. Data was collected through 520 questionnaires distributed to teachers from four countries. Factor analysis revealed a three component model similar to the three dimensions of Ernest's model (1991). Three philosophies of mathematics occur in mathematics teaching (Ernest 1989). They are instrumentalist, Platonist, and problem solving view of mathematics. The factors extracted in this analysis have correspondingly been named: a disposition towards appreciation of geometry, a disposition towards abstraction and a disposition towards activities.

Students' self-presentation strategies and academic achievement.
Carlo Tomasetto, University of Bologna, *Italy*
Maria Cristina Matteucci, University of Bologna, *Italy*

Starting from the work of Goffman (1959) suggesting that people play roles for audiences, the self-presentation strategies have been studied in hundreds of studies. Self-presentation consists of the self's effort to convey a particular image of itself, or information about itself, to other people (Baumeister, 1999). The idea that people are able to manipulate their image, often to secure some benefit by making the optimal impression, has been well supported (Leary, 1995). In this case (the strategic motive for self-presentation) self-presentation is guided by the audience's beliefs and values. The present research is aimed to study self-presentation strategies on students, by the way of causal ascription. Considering the theory of norm of internality (Dubois, 2003) and the social motivational approach (Weiner, 1995; Juvonen, 1996), an experimental study involving 91 subjects has been performed. We anticipated that people recognize the function of different explanation strategies, in order to make a good impression on others. The results confirm the hypothesis and, particularly, prove the role of effort as normative explanation in school context. Implications of the results for research on impression management and performance appraisal are discussed.

The interplay of cognitive and affective processes: students' approaches to learning and achievement in Hungary
Mária B. Németh, Research Group on the Development of Competencies,, *Hungary*

The permanent and successful renewal of knowledge is impossible without effective learning. Since Hungarian students performed below the expectations in the PISA studies, in November 2005 the Center for Research on Learning and Instruction of the University of Szeged examined the affective characteristics of 13 and 17-year-old students with regard to learning, administering an equivalent version of the questionnaire used in PISA-2000. The questionnaire consisted of 49 items in four categories (Learning strategies, Motivation, Self-related beliefs, Learning situations and preferences), which were divided into 13 characteristics. The students had to evaluate statements on a four point Likert-scale. The instrument proved reliable in both populations. The questionnaire was administered to 13- (N=3385) and 17-year-old (2037) students. The sample was representative for territorial coverage, gender and socio-cultural background. The results show that 13-year-olds have a more positive attitude to learning. They think more advantageously about their learning qualities and activities than 17-year-olds. They differ greatly in their mathematical interest, but not in their use of elaboration strategies. The students' interest in reading doesn't differ significantly between the two age-groups. Hungarian students prefer memorization in learning. Similarly to the PISA study, instrumental motivation had an outstanding position among mastery motives. The majority of students trust their verbal abilities, but they are uncertain about meeting the objectives in mathematics. The interest in mathematics decreases drastically between the two age-groups, but the evaluation of co-operative learning has improved significantly since 2000. While the individual student groups differ greatly with respect to cognitive performance, there is hardly any difference in affective personality features. This insignificant difference probably derives from the similar personality-shaping influences the students are subject to in classrooms. The data about the students' attitudes provides useful information for developing programs that aim to improve academic success and student efficiency.

On the formation of performance expectancies: The role of need for cognition and task difficulty
Marc-Andre Reinhard, University of Mannheim, *Germany*
Oliver Dickhäuser, University of Erlangen-Nürnberg, *Germany*

In this paper first the influence of cognitive motivation (NFC) and task difficulty on the process of expectancy formation should be analyzed. We assume, that differences in task difficulty only result in differences in performance expectancies when cognitive motivation is high (high NFC) but not when cognitive motivation is low (low NFC). This should be the case because analyzing the demands of the task (including analyzing task difficulty) is a process requiring cognitive capacity. Individuals low in need for cognition should less likely engage in such cognitive endeavors. Second, in line with considerations of Marshall and Brown (2004) we predict, that expectancies should not affect actual performance when the task is easy (because higher effort or higher persistence [as an effect of high performance expectancies] are not likely to increase performance in rather easy tasks). For difficult tasks we argue that expectancies should affect performance only when expectancies were formed via intensive processing (i.e. when NFC is high). When expectancies were formed via peripheral processing (i.e. when NFC is low), the expectancies should not be related to actual performance. The results of study 1 (N = 175 university students) were in line with our hypotheses: the interaction of NFC and task-difficulty affected expectancies. Only for participants with higher NFC task-difficulty had an influence on expectancies of success (with lower expectancies for the difficult task than for easy task). Given low NFC, no effect of task difficulty on the expectancies was found. Study 2 replicates the

findings of Study 1 with a different task (analogy-task) and found also support for our second hypothesis: Significant correlations of expectancy of success and actual performance were only found for participants with higher NFC and when the task was difficult. The findings from both studies have several implications for research on self-regulated learning.

Changing motivational orientation in group learning for statistics education: experiences from German and Dutch social science students.
Thomas Martens, Bremen University, *Germany*
Rob Martens, Leiden University, *Netherlands*
Cess de Brabander, Leiden University, *Netherlands*

Traditionally, in the social sciences many students consider learning statistics and research methodology as difficult and uninteresting. Students report high fear of failure and hold negative attitudes towards statistics. Following Self determination Theory (Ryan & Deci, 2000) it can be predicted that increasing students' sense of autonomy, competence and relatedness, intrinsic motivation will be enlarged and lead to more deep level learning, more persistence, curiosity and better study results. A special focus on relatedness is placed in collaborative learning. Combining both approaches, an instrument was used, QWIGI, which enables the measurement of group based feelings of relatedness, autonomy and competence as well as intrinsic motivation. The online version that was used, added a feedback modus, so that students got a tailored visual feedback of their scores compared to the group scores. The effects of this evoked group process was tested by two between subjects experiments, one at Leiden University in the Netherlands (n=63) and one at Bremen University in Germany (n=100). The use of QWIGI versus not using this online tool did influence intrinsic motivation negatively in the Leiden sample. In the Bremen sample using the tool did influence intrinsic motivation positively in one course, but negatively in another. Practical implications to improve collaborative learning in the difficult subject matter of statistics for social sciences will be discussed.

A longitudinal study of sustained motivation
Susan Beltman, Curtin University of Technology, *Australia*

The paper reports a study of the sometimes 'rocky' trajectories of high achieving athletes and musicians. It addresses the issue of sustained motivation over time, in relation to real-life activities requiring complex skills in multiple contexts of participation. The work is grounded in the latest developments in motivation research, which conceptualize motivation as situated, dynamic, interactive and multi-dimensional. A person-in-context perspective, which combines elements of sociocultural and socio-cognitive theoretical approaches to motivation, provides a conceptual framework for exploring sustained motivation. The research aims to explore how high achieving athletes and musicians appraise salient aspects of person and context as affordances and constraints, and how these appraisals shape motivation over time. Longitudinal and retrospective qualitative data were gathered about the life trajectories of thirty adolescent and adult participants, including details of their development and participation over time in sport and music, difficulties and life events encountered and how these had been dealt with. Analysis of semi-structured interviews and case summaries of individual participants revealed key aspects of person and context which contributed to decisions about persistence, modified participation or discontinued involvement. Three major findings emerged. Firstly, sustained motivation is inextricably linked to both person and context. Secondly, it is mediated by individuals' ongoing appraisal process of personal and contextual aspects of their current situation, which are interpreted as affordances or constraints. Thirdly, the nature and extent of participation is constantly revised due to ongoing

changes in personal and contextual circumstances over time. The research highlights the significance of a holistic understanding of motivation, the importance of individuals' subjective accounts and reflections, and the value of focusing on trajectories of motivation within and across contexts of participation and over time, in order to capture its dynamic nature.

Perfectionism, achievement goals and approaches to learning mathematics in higher education
Daria Rovan, Faculty of Philosophy, University of Zagreb, *Croatia*
Vlasta Vizek Vidovic, Faculty of Philosophy, University of Zagreb, *Croatia*

Drawing on 2 × 2 achievement goals framework (Elliot & McGregor, 2001), the aim of the present research was to examine relationship between perfectionism and achievement goals and to clarify the role of perfectionism and achievement goals in predicting students' approaches to learning. Participants were 358 undergraduate students enrolled in an introductory-level mathematics course. Adaptive perfectionism was significantly related to mastery-approach, performance-approach goal, and mastery-avoidance goals, while maladaptive perfectionism was related to mastery-avoidance and performance avoidance goals. Adaptive perfectionism was significantly related to deep approach to studying and this relationship was partially mediated by mastery-approach goal and suppressed by performance-approach goal. Significant relation between adaptive perfectionism and strategic approach was partially mediated through mastery-approach goal. Adaptive perfectionism had significant negative effect on surface apathetic approach, which was completely mediated by mastery-approach goal and suppressed by mastery-avoidance goal. Maladaptive perfectionism was not related neither with deep or strategic approach, but it was positively related to surface approach. This relationship was only partially mediated by performance-avoidance goal. Results of our research support previous findings that mastery and approach orientation is consistently linked to positive outcomes. Adaptive perfectionism has proven to be more relevant in predicting achievement behavior, than maladaptive perfectionism. Adaptive perfectionism can lead to the pursuit of challenging goals and result in desirable outcomes, and maladaptive perfectionism can be to some extent debilitating as it can lead to adoption of less effective approach to learning.

Training sudents' self-assessment and task selection skill to improve the effectiveness of learner-controlled instruction
Danny Kostons, Open University of the Netherlands, *Netherlands*
Tamara van Gog, Open University of the Netherlands, *Netherlands*
Fred Paas, Open University of the Netherlands, *Netherlands*

Learner-controlled instruction is advocated as a means to foster students' self-regulated learning competence, to inspire towards higher student motivation, and to increase student involvement in their own learning processes. However, studies comparing learner-controlled with system-controlled instruction have always assumed that students are capable of accurate self-assessment and appropriate task selection. Therefore, they have mainly been concerned with the effects of the instructional methods on motivation, student involvement and learning outcomes, not with the mechanisms that underlie the learner-controlled process. Since there is evidence that learners typically misassess their own competence, fair conduction of studies on the effects of learner-controlled instruction requires training students on self-assessment and task selection beforehand. This presentation focuses on the required input for the design of such training. Through a literature study and a pilot study, a model is built based on the cognitive mechanisms underlying the self-assessment and subsequent task selection process, and important training goals are identified.

L6
31 August 2007 11:00 - 12:20
Room: PP6
Poster Session

Poster session

Chair: **Éva Molnár,** University of Szeged, *Hungary*

Social interaction between pupils with special needs and their mainstream peers and the formation of group associations
Alison Wilde, University of York, *United Kingdom*
Elias Avramidis, University of York, *United Kingdom*

This paper discusses insights on peer group processes and self-identity gained from a recent study of disabled and non-disabled young people in English schools. Critical Discourse Analysis was employed to compare data gained from focus groups and individuals' diary entries. The research involved an examination of group negotiations of 'collective self' and more personal self articulations. It highlighted processes which contribute to the negotiation of group dynamics within mainstream educational contexts, focussing upon pupils' interactions within various milieux. In particular, this project examined how young people forged homophilic relationships according to variables of impairment status, that is, in creating bonds according to perceived similarities in impairment or 'special needs' status. Examination of the similarities and differences in group negotiations of 'collective self' and more personal self-articulations demonstrated the importance of exploring in more depth the degree and quality of social interactions between disabled and non-disabled pupils. In particular this indicated the need to conduct further investigation into processes of social group formation, cohesion and maintenance in educational contexts. This will provide valuable insights into how boundaries between students are identified and negotiated. Accordingly, the second part of the paper discusses this extension of our work focusing on the social impacts of inclusion on children with special educational needs (SEN) and their mainstream peers, while also identifying those educational practices largely determining the success of the process. In so doing, the concept of "homophily" is adopted to inform a mapping of the social positioning, friendships and self-esteem of all students, evaluating the extent of, and potential for, inclusion between groups. A methodology of sociometric, self-report and complementary qualitative techniques is proposed, providing a multi-layered understanding of the relationships between children's experiences of the school lifeworld and the application of teaching and wider school practices.

Learning through school self evaluation. A Delphi-study on necessary conditions
Jan Vanhoof, Antwerp University, *Belgium*
Peter Van Petegem, Antwerp University, *Belgium*

In a large number of educational systems school self-evaluations have become a common phenomenon. Although many stakeholders welcome these school self-evaluations, there is considerable doubt regarding their quality. The question as to (the explanation) of the differences which currently exist between schools has so far remained unanswered or rests on assumptions. When it comes to determining which criteria can be used to evaluate the quality of a self-evaluation, few research results are available. A general agreed upon set of criteria is strongly needed however. Therefore it is of essential importance to gather arguments, experiences and

opinions of relevant stakeholders. This paper reports on a Delphi study that initiated a communication process between Flemish (Belgian) stakeholders in order to explore different points of view and arguments. The research method consisted of consulting a group of well-selected experts in two rounds. It resulted in a set of criteria for meta-evaluation. These involve the nature of action points in which a school self evaluation should result according to the respondents and a list of agreed upon worthwhile effects. Necessary conditions put forward by the respondents in order to realise these effects are described. The operational framework that is described enables us to identify the strengths and weaknesses of (Flemish) schools with regard to relevant aspects of school self-evaluations.

Questions about Learning (QaL). Analysis of a questionnaire about self-controlled learning in vocational training
Berger Jean-Louis, University of Geneva, *Switzerland*
Nadine Kipfer, Swiss Pedagogical Institute for Vocational Educati, *Switzerland*
Fredi Büchel, University of Geneva, *Switzerland*

The Question about Learning (QaL) has been created with the intention to identify learning and motivational difficulties in vocational education and training. The aim is to present the QaL and its theoretical model. This model presupposes that academic performance depends on various variables, like metacognition, strategic behaviour and motivation. The instrument has been assessed on 590 vocational students in the French-speaking part of Switzerland. The students are engaged in a 3-years training or in 2-years initial training. Our final aim is to create an instrument that permits to identify difficulties in learning and motivation on vocational students in a 2-years initial training. The presentation will focus on the validation of the theoretical model that is based on metacognition and motivation. Secondly, we are interested in comparing 3-years and 2-years training, to identify if the QaL permit to distinguish between these training. Finally, a syndrome or classes analysis is presented. The results will be presented and various interpretations will be discussed.

Issues of addressing and creating understandings of diversity in a Swedish school development project – "Exemplary Schools for Diversity" (ISM)
Sangeeta Bagga-Gupta, Department of Education, Örebro University, *Sweden*

This paper reports findings based upon preliminary analysis from an ongoing study of data generated within the framework of a national school development project (MSU) – "Exemplary Schools for Diversity" project – that stretches over the period 2004-2008. Twenty schools have been selected annually from all over Sweden since 2004 by MSU on the basis of exemplary work that a school has done in the area of "diversity". Selection in the national two-year project for every cohort has implied both recognition in terms of being a "good example" vis-à-vis its diversity related work and earmarked resources for further development in a number of ways. The twenty schools thus selected in 2004 have together with MSU identified three specific areas for diversity related school development work: multilingualism, equity-participation and cooperation in local society. Three universities have furthermore been selected to offer school development training in these areas. The findings presented in this paper concern data generated from process-focused training offered by Örebro University for 19 of the 40 schools in the ISM project (ie. cohorts from 2004-2005) and a second group of schools from cohorts 2006-2007. The empirical materials comprise of self presented profiles of the ISM cohort schools, process related documentation from the 160 teachers and school leaders who have participated in the Örebro training programme, MSU documentation regarding the project, the school-development

programme offered by Örebro University and reflections of the teacher-educators involved in the project from the university. The paper presents preliminary analysis of the range of meanings that are subscribed to "diversity" by national agencies, schools, teachers and teacher-educators in Sweden in the new millennium. Issues regarding how categories are handled and accounted for highlight shifts and important ways in how identity issues get framed in terms of learning and communication by these actors.

Who is in need of special support? Negotiating and categorising pupils identities in the Swedish school

Lisa Asp-Onsjo, Department of Education, Göteborg University, *Sweden*
Eva Hjörne, Department of Education, *Sweden*

This presentation reports an analysis of how diversity is understood, defined and remediated in the Swedish school. More specifically we are analysing talk about pupils who are considered to 'be in need of special support'. Different categories and diagnoses, as for example ADHD, Aspergers syndrome or mental retardation, have come to play an important role when handling dilemmas encountered in the context of children who experience difficulties. The general interest of the work reported here is the issue of how such diagnoses (notably ADHD and retardation) are assigned to children. The analysis is based on recorded meetings from conferences in school where institutional representatives, for example, pedagogical and psychological experts, and parents meet. The task at hand is to talk about pupils alleged learning difficulties in school and how to attend to these. The findings show how the identity of the child is negotiated between parents (who are reluctant to consent to testing) and the school representatives. The latter, for example, have to persuade the parents that a certain category would be beneficial for everyone and include such arguments as that it would make it easier for the school to help the pupil. The results also show that the descriptions frequently used are vague and negative and refer to children's behaviours or inner characteristics. There is very little evidence of attempting to understand the child's problems as grounded in contextual factors and/or as having to do with the challenges facing the child in the classroom. At present, this results in an increased use of classifications referring to intellectual capacity or grounded in biomedical traditions (ADHD etc.) when categorising pupils in need of special support. This process has considerable consequences for the educational careers of pupils. The arguments from parents or pupils are mostly not taken into account in this process.

Understanding of numerical equivalence in preschool children with autism, developmental delays, and motor difficulties

Heloiza Barbosa, Federal University of Santa Catarina, *Brazil*

Cardinal equivalence is the ability to understand that three apples and three oranges are equivalent numerically. Studies' results demonstrated that typically developing children gradually develop the ability to judge equivalence. Initially, children focus on perceptually similar features in the sets to judge equivalence. But, by 4-years of age, children are able to focus on the numerical relations when judging equivalence between sets made up of both homogeneous and heterogeneous items. The aim of this study was to investigate whether young children with disabilities would have the ability to judge equivalence in homogeneous and heterogeneous sets, and whether training focusing on perceptual or relational similarities would influence performance on test of judgment of equivalence in this population. The study also investigated the correlation between counting and cardinality skills with equivalence understanding. Eleven children participated in this study, four children with autism, five children with developmental delays, and two children with motor disabilities. The experimenter presented each child with a target card and a choice card in a trial.

There were two conditions to this task: 1) High similarity, and 2) Low similarity. The cards had 1 to 5 items arranged horizontally and controlled for length and density. Each child completed a set of 11 trials for each condition. The task was presented in counter balanced order. Additionally, each child was requested to count sets from 2 to 10 items and to produce sets from 2 to 6 items. The results indicate that participants scored better than chance in training and they also scored better than chance on both high and low similarity sets. The results also indicated positive correlation among counting, cardinality and equivalence understanding. The study has strong implication for the teaching of math for preschool children with disabilities.

Attention deficits, motivational self-regulation and computer-based instruction
Thomas Weiss, Chemnitz University of Technology, *Germany*
Maria Bannert, Chemnitz University of Technology, *Germany*

Learners with ADHD lack more than "normal" learners the ability to adequately self-regulate their learning processes (Harris, 2004; Barkley, 2005), a competence which is essential for the effective execution of the majority of computer-based learning activities (Koerndle et al., 2006). With regard to the expected benefits of instructional technology for this learner-group and the increasing importance of lifelong learning the general question occurs, under which circumstances and to what degree learners with ADHD are able and willing to use computers and internet for self-regulated learning. The typical symptoms of learners with ADHD (high distractibility, low frustration tolerance, problems to persistently strive for goals; Barkley, 2005) give raise to the assumption, that especially the motivational self-regulation of learning (Pintrich, 2000; Rheinberg, 2000; de Corte, 2005) might be maladaptive. There is further evidence, that among the several variables involved especially area-specific self-efficacy expectations play an important role in the regulation process and are expected to be significant predictors for the willingness of utilizing computers for learning purposes and the efficiency of the actual learning process (Bandura, 1994). In the study presented (N=40) we tried to identify possible relations between the extent of attention deficits and further important learner-related antecedents of motivational self-regulation (especially area-specific self-efficacy), its relations to learner's motivational/ functional states in the context of a nonlinear computer-based learning task and the utilization of computers in the normal course of life. The findings support our general hypothesis concerning the negative impact of attention deficits on the motivational self-regulation of learning. However, self-efficacy for web-based learning doesn't seem to be the important mediator between attention deficits and motivational states during the learning process as expected, but at best part of a cluster of antecedents and mediating variables, which have to be in the focus of more detailed analyses and future research.

Regional educational initiative in centralized educational governance conditions: Cakovec
Petra Hoblaj, Center for Strategy and Development, Zagreb, *Croatia*
Ivana Batarelo, Faculty of Philosophy, University of Zagreb, *Croatia*
Vesna Ciglar, Teacher Training College in Cakovec, *Croatia*

This presentation presents results of a case study on the effectives of the regional educational initiative "School Improvement and Sustainable Leadership - Program for Education Development and Education Policy on Micro Level: Cakovec process". We attempted to answer three main research questions focusing on types of cooperation between stakeholders on a local level, types of cooperation on a regional level, and types of cooperation between local/regional stakeholders and central government. The results of data analysis imply that there is cooperation between stakeholders on a local level, and cooperation between local and central level. Still, cooperation on

a regional level is still not established. In a conclusion, it is emphasized that it is crucial to stimulate cooperation on a regional level. So that successful local educational initiatives could serve as a best practice examples for implementation of educational changes in different regions in Croatia and south-east Europe.

New forms of agency in school: Toward improving student learning and achievement
Katsuhiro Yamazumi, Kansai University, *Japan*
Michiko Shimada, Kansai University, *Japan*
Daisuke Itoh, Kansai University, *Japan*

This paper addresses new forms of agency in school to improve student learning and achievement from the framework of cultural-historical activity theory and the notion of expansive learning as a new form of pedagogy. In the paper, a students' after-school activity project in elementary and junior high schools in Osaka, Japan is illustrated and analyzed. It is an inter-organizational, multi-activity collaboration in which elementary and junior high schools, families and communities outside the school, and a university cooperate to improve student learning and achievement. The aims of this paper are to consider how such multiple different actors as school teachers, parents, experts and community members outside the school, and university students for internships and researchers/staff involved in the students' after-school activity project are engaged in shaping and sustaining expansive learning to redesign and implement new forms of learning activity to improve students' learning and achievement in schools. By crossing the boundaries of each activity system involved in the project, such expansive learning leads a collaborative self-organization in which participants learn school innovation together and become collaborative change agents of their own lives and futures in the school. The research project is conducting a series of laboratory sessions as empirical intervention research based on activity theory to facilitate participant expansive learning for designing and implementing new activities. The analysis of this empirical intervention research suggests that the process and cycle of participants' expansive learning in the after-school activity involved the creation of new tools, concepts, and rules for the emerging forms and patterns of multiagency and cross-school working to improve student learning and achievement. The findings of this paper argue that such multiple learning challenges through collaboration can create knots to act together crossing boundaries and shape multiple distributed agency.

L7
31 August 2007 11:00 - 12:20
Room: PP7
Poster Session

Poster session

Chair: **János Steklács,** Teacher-Training College Kecskemét, *Hungary*

Supporting learning in text-based asynchronous learning environments: shared conception of educational tasks in knowledge-building processes
Antoni Badia, Open University of Catalonia, *Spain*
Elena Barbera, Open University of Catalonia, *Spain*
Anna Espasa, Open University of Catalonia, *Spain*
Teresa Guasch, Open University of Catalonia, *Spain*

We now know a great deal about the development of teaching, social and cognitive presence in text-based asynchronous learning environments (Garrison, 2003; Garrison & Anderson, 2003; Kanuka & Garrison, 2004). Nonetheless, our knowledge is still insufficient when it comes to the processes of educational interaction related to the shared conception of educational tasks. According to Wertsch (1985) and Baker et al. (1999), an adequate and shared definition of the educational situation amongst participants provides the basis for students' appropriate self-regulation and effective knowledge building. An intersubjective definition of the situation can be achieved thanks to a process of interpsychological negotiation of the intrapsychological representations of each participant. The aim of the negotiation may be, amongst others, the learning objectives, role of the content, conditions to carry out the task or evaluation criteria. The research carried out aims to identify the way in which the shared conception of educational tasks is developed and, to do so, four educational situations taking place in a higher education text-based asynchronous learning environment have been selected: a chat forum, debate forum, cooperative work and individual work; with a total of 1961 emails. The messages and chains of messages related to this process of the shared conception of educational tasks are analysed in each of the four situations, using five categories of analysis: contribution of task information, global negotiation, significant negotiation, occasional negotiation and global confirmation. Findings revealed the differences in the appearance of the various types of statements, messages and chains of messages, depending on the learning activity, and also revealed the use of different discursive strategies depending on each type of educational task.

Between music and education: A case study of a graduate program in music education
Lia Laor, Levinsky College of Education, *Israel*
Mordechai Miron, Levinsky College of Education, *Israel*
Sara Shimoni, Levinsky College of Education, *Israel*

This case study examines an innovative two-year graduate program for music education at Levinsky College of Education in Israel. The program's goal is to train music educators as leaders who can introduce meaningful professional changes in their educational communities. The study documents and critically examines how participation in the program transformed students' attitudes and beliefs with respect to their professional identity as music educators as well as regarding their own professional development. It also considers how students' attitudes towards research have evolved, e.g., the relevance of research to their practice of music education, the

development of practice-based research interests, and the way in which students' own research projects integrate theory and practice. The study uses qualitative and quantitative methods. The findings present students' negative attitudes towards including education and research methodology courses in the program curriculum. These findings may reflect students' conservative attitudes concerning the role of educational theory and research, which may have formed during their undergraduate studies. At the same time, the quantitative data indicate noticeable changes in students' professional self-perception. Students gave a high ranking to their own capacity to employ theory and research perspectives in their work as music educators. The implicit conflict revealed in the students' attitudes may reflect an historical bias of music educators, who have traditionally valued art over science and considered art as the fruit of genius rather than of education. A revision of graduate as well as undergraduate curricula in music education is called for at this juncture. This revision will serve to demonstrate how an inquiry-based curriculum supports the professional development of music educators.

Are frequency dictionaries specific for children necessary? Comparative study of a child and adult lexical frequency dictionaries
Jesus Martinez, Universidad Pontificia de Salamanca, *Spain*
Emma Garcia, Universidad Pontificia de Salamanca, *Spain*

Our work will organise in two main parts. First of all we will present a Frequency Dictionary that we have developed for the lexical units that a child will encounter during its reading experiences during the six years of the Spanish primary school. We will describe the special procedure we have used to gather the almost 100.944 entries that this dictionary it contains. In the second part of the poster we will compare by means of Pearson correlations the and regression analysis the frequencies of different entries in our work and in two adult frequency dictionaries in order to determine if the child dictionary is different enough from the adult versions to justify its own entity.

The content-based improvement of learning skills in grade 5
Róbert Pap-Szigeti, Department of Informatics, GAMF, Kecskemét College, *Hungary*
Gabriella Zentai, BMHUFIK, Békéscsaba, *Hungary*

In our poster we present the methods of a content-based training experiment and the results of the year long training. The programme aims at the improvement of the basic learning skills, during which the preferential subject contents, the comprehension of basic concepts and the actuation of abilities and skills through these contents play an equally important role. The training programme included ten-year-old students (5th grade, N=350) and was carried out within the frameworks of Nagy Jôzsef's conception. During the training, students processed texts including the basic concepts of different subjects.The systematic processing of texts aimed at the improvement of the reading skill. At the beginning of the following lessons we actuated the skill of systematization, comprehension of relations and combination. The method meant the completion of short exercises that was made varied by the diversity of learning methods. The exercises of the training were designed to cover 8-10 issues per school subjects, so each skill element was activated in case of more than 30 training exercises. The training lasted for one school year.During the training we experienced a progress of reading ability, systematization and combinative thinking that significantly exceeds spontaneous development known from cross-sectional studies.The number of schoolchildren being able to actuate the skill on a high level has increased in case of all the three skills, and at the same time the order of children has been rearranged to a significant extent. In case of the comprehension of relations, the progress has not exceeded the spontaneous

development estimated by the cross-sectional study. Correlations between the developments of these skills are moderate. Continuance of the training seems relevant, since students showed significant individual differences concerning the developmental level of their skills. However, results of the training experiment has pointed out that learning subject contents facilitates successful improvement of study skills.

Frequency effects in split-digraph development: Implicit learning of a conditional spelling rule
Megan Patrick, Oxford University, *United Kingdom*
Peter Bryant, Oxford University, *United Kingdom*

Learning to read and spell English requires a child to master the alphabetic properties of the language and the orthographic rules of its writing system (e.g. silent 'e', soft 'c'). In the UK, schools explicitly teach orthographic principles as rules, without formally addressing children's implicit learning. For example, schools teach that for 'silent e' (split digraphs) the final 'e' makes the middle vowel long (e.g. rat-rate, hop-hope) and expect children to master the concept from the rule. This study aimed to determine whether children use implicit, frequency-based learning in addition to explicit instruction when they learn split digraphs. If a child does learn split digraphs via a general rule, then she should perform consistently on all –VCe patterns. On the other hand, if she uses implicit learning, she should perform best at the most frequent –VCe patterns. We tested 52 children in Year 2 (mean age: 85.9 months) and Year 3 (mean age: 94.3 months) on reading and spelling in four different categories: high-frequency –VCe words and their –VC counterparts and low-frequency –VCe words and their –VC counterparts (e.g., 'bame'-'nam'; 'pode'-'lod'). We used pseudo-words to eliminate the effects of word recognition. The children performed better on high- than low-frequency -VCe words, confirming a frequency-effect in reading and spelling split digraphs. They applied the split-digraph rule to low-frequency -VCe words at above-chance levels and did not apply it to short-vowel -VC words, demonstrating that they employ the rule beyond the frequency effect. Finally, the frequency effect correlated to the children's exposure to text, measured by the Title Recognition Test (Cunningham & Stanovich, 1990). Altogether these results indicate a role for implicit learning in children's development of the split-digraph rule and provide an explanation for the link between learning reading and learning spelling proposed by Frith (1985).

Dimensions of topic-specific epistemological beliefs as predictors of multiple text understanding
Helge Strømsø, University of Oslo, *Norway*
Ivar Bråten, University of Oslo, *Norway*
Marit S. Samuelstuen, Norwegian University of Science and Technology, *Norway*

Students' beliefs and theories about knowledge and knowing seem to be of importance when dealing with a complex learning task such as the reading of multiple texts. In this study, we aimed to investigate whether different dimensions of topic-specific epistemological beliefs might predict students' understanding of seven texts representing partly conflicting views on climate change. One-hundred and forty-four undergraduates responded to questionnaires on prior knowledge and topic-specific epistemological beliefs before they read the seven texts. After reading, participants were given tasks intended to assess surface and deeper understanding, as well as intertextual understanding. Factor analyses revealed four dimensions of topic-specific epistemologies concerning certainty, simplicity, source, and a critical stance to knowledge about climate. We performed three hierarchical multiple regression analyses with the text comprehension measures as dependent variables. The analyses showed that simplicity beliefs viewing knowledge about climate as consisting of highly interrelated concepts, positively predicted scores on all three reading tasks,

that is, sentence verification, inference verification in single texts, and inference verification across texts. In addition, sophisticated certainty beliefs holding that knowledge about climate is tentative and evolving rather than absolute and unchanging, positively predicted inference verification across texts. Finally, sophisticated source beliefs negatively predicted inference verification in single texts, suggesting that students should not rely too heavily on their own construction of meaning at the sacrifice of expert opinion when confronted with a complex topic like climate change.

Memorization strategies oral vs written of Chinese vs English words by French children
Nathalie Spanghero-Gaillard, Laboratoire Jacques-Lordat / Toulouse 2 University, *France*
Pascal Gaillard, Laboratoire Jacques-Lordat / Toulouse 2 University, *France*
Marie-Ange Dat, Laboratoire Jacques-Lordat / Toulouse 2 University, *France*
Helene Chareix, Laboratoire Jacques-Lordat / Toulouse 2 University, *France*

In the foreign languages learning, the use of the multimodality (sound, text, image) directly in foreign language (target language) seem an asset if the combination word/image is coordinated (Merlet, 1998). Several work highlights the importance of the indices taken by the individual for the catch information vis-a-vis a complex object (Pudelko, 2002 ; Sweller, 2003). However, the nature of these indices seems particular depend on individual and would result from the interaction of several factors: characteristics and personal abilities such as the age, the lived experiments and the social environments in which he evolved. The reference to the significance at the time of the learning seems essential to already connect new information to those known and proves more effective than the simple recourse to the formal aspects (Baddeley, 1994). Our work fit in these fields of research; they attempt to highlight the elements constituting the objects of the world that would be used as assistance with the learning of a knowledge on these objects. We are interested more particularly in the lexicon learning in L2. The experiments reported here concern a population of French children (8-11 years) subjected to a series of tests in foreign languages: a task of recognition of words followed a phase of training in a picturesque context (each word indicated an object drawn in the screen), in English vs. Chinese as foreign languages, oral method vs. written. The data collected are the performances of the children (rate of correct designations of the indicated objects) comparisons with the courses of consultation of the board coloured at the time of the phase of training. The results reveal differences in treatment according to the age of the children and according to the degree of transparency of L2 compared to L1.

Assessing the use of foreign language learning strategies and their effectiveness at the upper secondary comprehensive schools in the Czech Republic
Katerina Vlckova, Masaryk-University, Centre of Educational Research, *Czech Republic*

The use and effectiveness of foreign language learning strategies (FLLS) was assessed by SILL inventory constructed on the basis of Oxford FLLS taxonomy (1990) at upper secondary comprehensive schools in the Czech Republic. The article describes using of 85 strategies – direct (memory strategies, cognitive, compensation strategies) and indirect strategies (metacognitive, affective, social). The strategies were used at average only seldom. 40% of the SILL strategies are not used at all, 85% are used not enough. Direct strategies were significantly more used than indirect strategies. The significantly most used group of strategies were compensatory strategies, the least used were affective and memory strategies. Half of the 606 learners were not interested how to learn effectively or better, most of them do not have goals in learning and do not plan learning. From the 85 strategies only 46 was found to correlate with some of the indicators of learning effectiveness. In addition 87% of these 46 strategies are less used, whereas 26% from

these 46 strategies are very seldom or never used. The most effective group was cognitive strategies. In the regression model the strategies explain quite well and significantly the grade at school and the proficiency, the model is better if we include some other variables like motivation, stay abroad, and teacher). A significantly positive effect of teacher on learning strategies was found.

L8
31 August 2007 11:00 - 12:20
Room: PP8
Poster Session

Poster session

Chair: **Beatrice Ligorio,** University of Bari, *Italy*

Co-constructing joint activity and meaning in technology-enriched peer activities
Kristiina Kumpulainen, University of Helsinki, *Finland*
Satu Vasama, University of Oulu, *Finland*
Marjatta Kangassalo, University of Tampere, *Finland*

This poster outlines an ongoing study which illuminates the co-construction of joint activity and meaning in technology-enriched peer activities. Of particular interest are the role negotiations and social elements of children's explanations constructed during computer-mediated peer-centred learning activities. Theoretically, this study investigates the potential of sociocultural perspectives of learning and development to provide new insights into the processes of children's collaboration and social construction of meaning in computer-mediated peer activities (Mercer, 1996; Wells, 1999). The methodological foundations of this research study base on earlier studies on collaborative learning, developmental psychology and sociolinguistic approaches (Kumpulainen & Wray, 2002; Littleton & Light, 1999). The empirical data of this study were collected in two phases and involved classroom community of 22 children, aged between six to eight years. The learning activities and tools in the unit consisted of child-initiated, exploratory activities during which children had versatile tools in their use, including a multimedia learning tool, PICCO. This research study is part of PICCO-research project. Picco is an ongoing research project that investigates children's science learning and thinking in social context of a multimedia environment in an early year's classroom. The PICCO research project is conducted by Docent Marjatta Kangassalo, University of Tampere, both with research partner Professor Kristiina Kumpulainen, University of Helsinki. The international research partners are Professor Karen Littleton, Open University and Emeritus Professor Setsuo Ohsuga, University of Tokyo. The project will broaden and deepen the existing research work of the research partners particularly in relation to young learners' conceptual thinking and learning of science within the social contexts of technology-enriched classrooms.

Learning from critical incidents in the supervision of research
Michael Christie, Chalmers, *Sweden*
Arjan Snijder, Astra Zeneca, *Sweden*
Tom Adawi, Chalmers, *Sweden*

In this paper the authors report on a piece of action research (using the critical incident technique) in the area of PhD supervision. Twenty eight supervisors, most of whom are co-supervisors, were instructed in critical incident technique (Flannagan, 1954) and then asked to write incidents from their supervision experience. The incidents could be about mundane matters but they became critical, in the meaning of this technique, when they were analysed or 'critiqued'. The incidents we collected were critiqued in four stages. First, by the individual authors who wrote down their own analytical reflection of the incident. Second by focus groups consisting of five authors per group. Third, by a plenary session that discussed the reports from each group; and finally, by the researchers, who accessed the written incidents and individual reflections as well as the plenary discussion and summaries from the focus groups. The incidents were classified according to type and their actual and potential consequences examined. Possible assumptions underpinning the incidents were also analysed individually, in focus groups and by the researchers. Our aim was to heighten the supervisors' awareness of issues in supervision and to give them a tool for future reflection and analysis. Many of the incidents were problematic even though the informants had been asked to simply write down an event they remembered as a supervisor or as a former PhD student. Issues and conflicts relating to co-supervision were a dominant theme. Supervisors were helped via this action research to find ways of preventing or overcoming this and other types of conflict. One recommendation from our study was that a transparent structure and set of rules governing co-supervision be defined and implemented. Reference: Flannagan, J (1954). 'The critical incident technique' in the Psychological Bulletin, volume 51.

Schoolteacher meetings and analysis of talk
Inger Österlund, Åbo Akademi University, *Finland*

Previous researches show that teacher collaboration promotes success in students' performance. Nevertheless the topic has not been of much interest in educational research. Teacher collaboration arises naturally in situations of problems or crisis but after the situation is solved the work continues as before. The point of intersection between different teaching subjects and the shared educational practice point out teacher collaboration. This paper describes empirical results that are based on analysis of video tapes from schoolteachers' meetings. The aim is to throw light on styles of talk and investigate the impact of different subjects. The study highlights the question; is there a pattern in teachers' talk with each other that either develop or prevent collaboration? The gap between two approaches, a socio cultural perspective (Bourdieuan) and a constructivist (Berger and Luckman), is filled with interactional sociolinguistic by John Gumperz. The analysis uses contextualisation cues and takes a hearer's perspective. The preliminary results are described by sequences of critical situations. A preliminary finding is that small teacher meetings with 4-5 teachers including the principal provide more social interaction and talk at meetings than a larger group of teachers. An overall purpose of the research is to underline the potential that each teacher has as a human capital. Teachers' recognition of different perceptions in the shared educational practice extends the collegiality in an open collaborative culture. Certain phenomena or pattern of talk draw attention to parts that are not noticed which develop a further discussion about a more extended teacher collegiality, an open collaborative culture and recognition of pluralism in educational leadership.

Different study ways, diverse student self-images
Erzsébet Golnhofer, Eötvös Loránd University, *Hungary*

Project objectives: 1. To get to know the student self-images of those studying at different levels of education. 2. To understand the effect of different study experiences on the development of the student self-image. 3. To go beyond the self-estimation focused cognitive approach. Questions posed: What does it mean for the student to belong to students as a category in social identity? Are there any differences, and if so what are they, between students with different study histories? The researchers accepted the narrative paradigm that identity is essentially a continually re-edited life-story. Individuals' stories are not simply their own idiosyncratic narratives, but stories which are embedded in a common culture and rooted in shared experiences. Suppositions: a/ Students create different stories about the same experiences they have gone through, but school culture "designates" the possible narrative variations. b/ The school's internal mechanisms of selection form different cultures, propose different career options, which offer a variety of possible drafts. In the project a predominantly qualitative strategy was applied. 385 students were asked to write life-stories, self-characterisations, and student metaphors. A narrative contents analysis formed part of the analysis, which provided an opportunity to interpret the components of student life-stories, the themes and the quality of the stories. The following formed part of the complex analysis: - the revelation of the meaning and the coherence of student self-image; - the examination of the relationship between student self-image, academic success and background variables; - the interpretation of the emotive fields in connection with the school. The general results of the project were: 1. Narrative text analysis can be effective tools in pedagogical research. 2. Individual student stories can provide information on how school selection mechanisms influence student social identity.

Students' experiences with contrasting learning environments: about what students' perceptions learn us.
Katrien Struyven, KULeuven, *Belgium*
Filip Dochy, KULeuven, *Belgium*
Steven Janssens, KULeuven, *Belgium*

This study investigates the effects of two contrasting learning environments on students' course experiences and compares a lecture based setting to a student-activating teaching environment. Data (N=608) were collected by the Course Experience Questionnaire (Ramsden, 1991). Results show that the instructional intervention influences students' course experiences, in opposite directions of the assumptions though. In declining order, the following scales (5 out of 7) reveal statistically significant differences: Clear Goals and Standards; the General scale; Appropriate Workload; Good Teaching and the Independence scale. In addition, when the assessment mode is considered, also the Appropriate Assessment scale demonstrates significant results. Moreover, the same teaching/learning environments lead to diverse students' perceptions. While the perceptions of lecture taught students were focused and concordantly positive, students' course experiences with student-activating methods were widely varied and both extremely positive and negative opinions were present. Students' arguments in favour of the activating setting are the variety of teaching methods, the challenging and active nature of the assignments and the joys of collaborative work in teams, whereas students express dissatisfaction to the perceived lack of learning gains, the associated time pressure and workloads, and the (exclusive) use of collaborative assignments and related group difficulties. Note: Tables and Reference list: see Appendix 1

A deliberative inquiry with experts in e-learning: Dispelling the myths
Elaine Laflamme, McGill University, *Canada*
Heather Kanuka, Athabasca University, *Canada*

This study builds on the results of a prior study where the aim was to determine how learning management systems (e.g., WebCT, Moodle, FirstClass) change higher education learning experiences. Findings from the prior study provided good data in regard to the categories of where learning management systems (referred to as simply e-learning) is impacting learning experiences (Laflamme & Kanuka, 2006). However, in the prior study there was a lack of consensus on whether these changes were positively or negatively affecting the higher education learning experience. The purpose of this study was to build on these results and determine if consensus could be established through a deliberative inquiry with experts in the field of e-learning. Gathering data that establishes consensus and divergence of opinion can provide important information which can, in turn, influence not only the implementation of e-learning practices, but also policy development. The results of this study did not gain consensus on identified aspects of e-learning technologies; rather, the participants took a critical realist perspective and established consensus on the pervasive myths about e-learning technologies. Based on the data from this study, we conclude that (1) we currently mythologize many aspects of both on-campus and off-campus learning, and (2) consensus tends to be reached on non-consequential and/or low impact issues. The findings of this study, which reveals pervasive myths about e-learning, can help public policymakers, higher education administrators, leaders, and teacher-practitioners make more informed decisions on the use of e-learning technologies in higher education, especially in regard to effective e-learning policy implementation and practice.

Teaching approaches in higher education: The influence of personal and contextual factors
Peter Van Petegem, University of Antwerp, *Belgium*
Ann Stes, University of Antwerp, *Belgium*
Vincent Donche, University of Antwerp, *Belgium*

Former research (e.g. Calderhead & Robson, 1991) has shown the interrelatedness of conceptions of teaching, approaches to teaching and teaching strategies. Recent studies also underline (e.g. Nevgi et al., 2004; Entwistle et al., 2003) the importance of studying teaching approaches in close relationship with a variety of personal and contextual factors. From all this literature we deduct in this paper a holistic framework that can contribute to a better theoretical understanding of differences in teaching approaches in higher education. Two empirical studies, carried out in the context of higher education in Flanders, partially explored the presented framework and illustrate pathways to deal with more complexity in studying teaching approaches. Research within the holistic model is also fruitful with regard to the topic of professional development of teachers: it helps to put the 'educational change' for which the plea is made in actual training programmes, into a relational perspective.

Internationally trained professionals research assistant program: Thinking outside the box
Snezana Ratkovic, Brock University, *Canada*
Michelle McGinn, Brock University, *Canada*

With expansion at the postsecondary level due to increased numbers of students and graduate programs at small Canadian universities, there is likely to be growth in research projects conducted at those universities. Consequently, professors will also have a growing need for research assistance. Historically in Canada, the role of research assistant has been fulfilled by

graduate students. However, we began to recognize that newcomers to Canada often have the skills to work as research assistants but lack opportunities to do so. The purpose of this study was to explore an existing Higher Education Research Assistant Program at a Canadian university and its potential for increasing research skills and integrating internationally trained professionals into the Canadian culture and economy. The program consisted of 25 weeks of workshops and on-the-job training. Eighteen Internationally Trained Professionals and 4 Instructors participated in the program. The data collected in this action research included semi-structured individual interviews, focus group interviews, participants' reflection sheets, and participants' assignments. This paper will address main challenges and benefits encountered by the internationally trained professionals and their instructors while in the program.

Foreign language aspects of a doctoral viva
Yehudit Od Cohen, Ohalo College for Teacher Education, *Israel*

This paper addresses the linguistic and the social aspects of a doctoral viva voce examination, with the aim of elevating the prospects of a successful defence by refining the social and foreign language skills. I can share my experience, combined with my knowledge of the teaching and learning of English in order to provide insight upon the dynamics of a doctoral viva from a foreign language perspective. This may become useful to doctoral candidates, or directors of studies of such candidates, who wish to defend their theses successfully using a foreign language. The paper first analyses the linguistic issues involved in defending a doctoral thesis, the knowledge required for this defense during a viva exam, and then offers practical advice for a successful thesis defense.

L9
31 August 2007 11:00 - 12:20
Room: PP9
Poster Session

Poster session

Chair: **Tommy Dreyfus,** Tel Aviv University, *Israel*

Promoting learning: Student-centred activities in a pathology course
Maria Weurlander, Department of Learning, Informatics, Management an, *Sweden*
Annika Ostman Wernersson, Department of Laboratory Medicine, Division of Pat, *Sweden*
Magnus Soderberg, Department of Laboratory Medicine, Division of Pat, *Sweden*
Italo Masiello, Department of Learning, Informatics, Management an, *Sweden*

The aim of this study was to evaluate the students' perceptions of a new form of case seminars as a teaching method and to investigate in what way the seminars contributed to learning as perceived by the students. Method: Fifty-three medical students participated in the study. After the case seminars the students answered two open-ended questions. The answers were analysed with a qualitative approach where the emerging themes were grouped into categories. Preliminary findings: The case seminars in pathology were a positive learning experience for the students. Four aspects of importance for learning were identified. 1) Motivational aspects concerned an increase in interest and motivation to learn. 2) Knowledge building aspects included enhancing memory formation and facilitation of understanding. 3) The case seminars seemed to help the students to

relate textbook knowledge to a real world context and future profession, which can be described as the contextual aspects of learning. 4) The cooperative aspect of learning was mentioned as important by the students. Conclusions: Our findings suggest that the case seminars we developed are helpful at enhancing student learning, and they could therefore serve as an example of a student-centred teaching method.

Scientific precursor models construction: A science learning and teaching approach in preschool education.
Sabrina Canedo Ibarra, University of Barcelona, *Spain*
Josep Castello Escandell, University of Barcelona, *Spain*
Paloma Garcia Wehrle, University of Barcelona, *Spain*

In this paper some results are presented about young children scientific precursor models construction using scientific procedural and communication skills. The aim of this research was to describe how young children aged 5-6 years construct their explanations concerning different natural phenomena in a dialogical context. This exploratory study used a qualitative data collection and analysis, and was conducted in three phases: pre-interview, instructional process and post-interview. In this paper we present results about Flotation precursor model construction based on the objects material´s nature as an indicator of an intuitive approach to density. At individuals interviews we asked the children to predict the possible flotation or immersion of cubes made of different materials and of different sizes. After they had carried out their experiments, we asked them to compare the experimental results with their initial predictions and give their explanations. On analyzing children's answers we realized that several children were lead to both the construction of a precursor model and a general qualitative upgrade of reasoning. We conclude that children were able to consider flotation more accurately in terms of the event itself. They changed their way of justifying flotation towards a scientific way of looking at flotation. Notable differences occurred among the children who expressed non relevant or no-scientific explanations, therefore we assume that educational activities were effective. In the context of preschool education this approach could improve scientific teaching and learning to a better understanding of science topics in order to develop the basis of scientific literacy.

Reviewing students' conceptions of problem solving. In fact, what sort of problems are they talking about?
Ana Remesal-Ortiz, Universidad de Barcelona, *Spain*

This paper deals with an important source of individual differences often forgotten about in the classrooms. It presents a study about primary school and compulsory secondary school students' conceptions of mathematical problems and the consequences these conceptions might have for the teaching and the assessment of these students' mathematical performance by their teachers. A total amount of 60 students aged 8 to 16 from 9 different urban and suburban schools were clinically interviewed in order to access their conceptions of mathematical problems. Two different basic conceptions of mathematical problems were identified through a qualitative content analysis. The results reveal that students' conceptions are linked in some way to the classroom assessment practices in which they take part. Educational experience (thus age) and (most important) achievement seem to be influencing elements on the way they conceive of mathematical problems, as far as older low-achievers share the same simple conception of mathematical problem as younger students.

Evaluation at the service of the educational system
Anat Raviv, Ministry of Education, *Israel*

The study focuses on the Israeli education system that has to cop with pupils of significant social, cultural and socioeconomic variance that are new immigrants coming to Israel from all over the world. This challenge produces a collaborative model of cooperation including all partners in the elementary schools system. The aim was to engage all the education system to cop with the target of increasing pupil's knowledge and well being in order to help them to integrate more successfully in the Israeli society. The program was associated with an assessment and evaluation program. The intervention programs at the different levels lead to a significant improvement in the pupils' achievements and in their integration into the education system, as a basis for their successful integration in society. The model can be used in other countries to respond to the needs of many immigrant pupils, who find it difficult to integrate into school and society at large.

Child care students: procedural conceptions of learning in a vocational context
Gillian Boulton-Lewis, Queensland University of Technology, *Australia*
Joanne Brownlee, Queensland University of Technology, *Australia*
Donna Berthelsen, Queensland University of Technology, *Australia*

This paper presents an analysis of the transcripts of interviews with 77 first and second year child care students for conceptions of learning. All six categories of conceptions as identified originally by Marton, Dall'Alba and Beaty (1993) were found, but in a procedural mode, and about 50% of these were at level A (increasing knowledge, getting information). This category was richer and more differentiated than has been found previously and had a very practical, applied focus. The participants did not generally situate learning in a formal context based on reading theoretical material but rather on learning by observing and doing. The results are compared with similar responses for informal and workplace learning. The students' conceptions could present challenges for lecturers who expect that they will underpin skills with theoretical knowledge and this has implications for students' practice. It raises the question of how to move students' conceptions to a higher more theoretical level.

The role of conceptual knowledge on word problem solving. An instructional design for low-ability children
Jose Orrantia, University of Salamanca, *Spain*
Santiago Vicente, University of Salamanca, *Spain*

Different hypotheses have been advanced to explain why children succeed or fail in addition and subtraction word problem solving. Prominent among these is the hypothesis that conceptual knowledge is an important foundation for successful problem solving. The present study has been designed to analyse this hypothesis. When we talk about conceptual knowledge, we mean an understanding of the semantic relations (schemata) described by the problem text, this is, knowledge about increases, decreases, combinations, and comparisons involving sets of objects. In turn, to be able to operate with these semantic relations depends on acquisition of knowledge concerning part-whole relations. To analyse this hypothesis, we developed an instructional program in order to improve word problem solving ability of low-ability children. The essential components of this program are: textual processing (construction of the text base in terms of reading comprehension), schema identification (with the help of schemata diagrams), and representation in terms of a part-whole structure. Our goal was to analyze how different aids related to these components were incorporated by children. For this, the instructors worked

individually with a sample of children and provided them with help related with the different components of the program. In this way, the amount of help that the children needed was recorded. The results showed that the most of the interventions of the instructors were directed to the processes related to reasoning based on the quantitative part-whole schema, wherein representing the part-whole schema means understanding numbers as parts of each other. These results allow us to say that studies designed to facilitate word-problem solving, such as schema-based instruction, could be effectives. However, we must be aware that an important part of students would show resistance when trying to incorporate strategies that we are trying to teach it.

The preconceptions and misconceptions of French students related to petroleum
Dal Burckin, Istanbul Technical University, *Turkey*

The identification of student misconceptions in science has a research tradition stretching back 25 years. While extensive efforts have been made in physics, biology, and chemistry to identify student misconceptions, misconception research in the earth sciences has been more limited. For example, students hold a surprising number of misconceptions about petroleum. This paper reports the findings of a survey conducted to investigate the persistence of petroleum misconceptions into adulthood revealed many held the same ideas as elementary students, confirming the importance of addressing younger students' ideas during instruction.

Thinking about changes in beliefs as conceptual change
Bettina Roesken, University of Duisburg-Essen, *Germany*
Peter Liljedahl, Simon Fraser University, *Canada*
Katrin Rolka, University of Dortmund, *Germany*

In this paper we argue that the theory of conceptual change – which is based on Kuhn's (1970) work – can be used to describe changes in preservice teachers' beliefs about mathematics and its teaching and learning. In particular, the theory of conceptual change can be used to more closely examine instances of belief replacement. Since our specific focus in this paper is to rationalize why this is a fruitful theoretical framework we only give a brief presentation of data. We present the results of the analysis of one participant whose journal is most representative of belief change. These results are discussed according to the criteria of lived experience, belief rejection, and belief replacement.

KN3 1
31 August 2007 12:30 - 13:30
Room: Gömb Aula
Invited Paper

Developing potentials for learning: Evidence, assessment, and progress

John Hattie, The University of Auckland, *New Zealand*

Chair: **Filip Dochy,** K.U.Leuven, *Belgium*

The session will overview a synthesis of over 600 meta-analyses of effects on achievement, highlighting the major themes that influence student learning. From these themes, the presentation will demonstrate the development of an assessment model of student learning that has been available and extensively used in NZ elementary and high schools over the past 5 years. A particular theme of the assessment model has been methods for helping teachers see and understand student progress, enable them to set targets/high expectations, and provide feedback so that there are more aware of the importance of some of the key competencies that act as enhancers or barriers to learning.

KN3 2
31 August 2007 12:30 - 13:30
Room: Konferencia
Invited Paper

University-mediated student achievement: an exercise in organizational learning

Hugh Mehan, University of California San Diego, *USA*

Chair: **Fritz C. Staub,** University of Fribourg, *Switzerland*

This paper describes the efforts of the Center for Research on Educational Equity, Access, and Teaching Excellence (CREATE) at the University of California, San Diego (UCSD) to improve the opportunity for low income students of color to attend colleges and universities by assisting public schools in San Diego adapt the principles developed at the highly successful Preuss School on the UCSD campus to their local circumstances. CREATE, operating as an "educational field station," serves as a mediator between the Preuss School and local schools that have expressed an interest in building a college-going culture of learning in order to improve the education of underrepresented minority students. The research goal is to understand learning as a process distributed among organizations, how organization-level factors shape the behaviors of the people who constitute the organization, and the ways in which inter-institutional collaborations facilitate or inhibit learning. "Organizational learning" will have occurred when new information has been instantiated in new practices and routines and that new information is encoded in organizational artifacts (such as instruction manuals, code books, organizational charts). Inter-institutional learning, in this view, will be manifested in more effective forms of joint activity, e.g. mutual modifications in the service of the organizations' common goals. The research problem is to determine whether, through inter-organizational collaboration, the UCSD-based school and the inner city schools (Lincoln and Gompers Charter Middle School) can create a learning system that will enable the latter to achieve at a comparable level of achievement to the former. The collaboration will require organizational learning in three institutions: UCSD, The Preuss School, each of the two inner city schools.

KN3 3
31 August 2007 12:30 - 13:30
Room: Harmónia
Invited Paper

Learning and motivation in kindergarten and elementary school

Jari-Erik Nurmi, University of Jyväskylä, *Finland*

Chair: **Benő Csapó,** University of Szeged, *Hungary*

Learning-related problems are common among children and adolescents. This is an unfortunate situation because basic academic skills, such as literacy, mathematics, and goal-directed learning, do not only provide a basis for subsequent academic achievement but also for the socialization into successful citizenship within the present information society. Not only does efficient learning consist of appropriate cognitive processes, it also requires a motivational state that sustains an individual's perseverance towards learning tasks. For example, amongst children with a history of low achievement and learning difficulties, the anticipation of failure in an academic context leads to a lack of task motivation and the use of task-avoidant strategy. These maladaptive patterns may then strengthen low achievement and problems in learning. The learning of children and the associated difficulties occur in a variety of contexts. During the first years of life, family forms the major environment. When children begin school, teachers and the classroom context begin to play an important role. Although quite some research has been conducted on the role of parents and some on the role of teachers in children's learning and motivation, little research has been carried out on the impact of a child on child-adult interaction. This presentation will focus on three topics: 1. Do motivation, and achievement-related beliefs and behaviors impact children's learning in kindergarten and at elementary school? 2. Do the development of literacy and the development of mathematical skills show a different pattern over time? 3. To what extent do parents and teachers impact children's learning and skill development in kindergarten and at elementary school? The results presented come from several cross-lagged longitudinal studies in which children's learning and motivation is followed several times during each year from kindergarten to the first grades of elementary school.

M 1
31 August 2007 14:35 - 15:55
Room: Konferencia
Expert Panel Discussion

A predictive systems approach to the assessment of self-regulated learning.

Chair: **Monique Boekaerts,** Leiden University, *Netherlands*
Organiser: **Monique Boekaerts,** Leiden University, *Netherlands*
Organiser: **Eduardo Cascallar,** Leiden University; Assessment Group International, *Belgium*

In order to coach teachers adequately, researchers need to supply them with the tools that can capture students' successive attempts at self-regulation. Ideally, teachers should be able to determine the zone of proximal development in self-regulation. In order to do that, they need to predict expected outcomes in terms of the self-regulation strategies that their students are capable of using. How can they be coached to achieve this? First, teachers need insight into the logical structure of SR development in a domain. Second, they need a set of assessment tools that capture their students' current level of self-regulated learning. Researchers need to provide teachers with this information and with the necessary assessment tools. Unfortunately neither the information nor the tools are available at present. Predictive approaches offer the opportunity to model self-regulation in the classroom. They are capable of discovering complex relationships and interactions in the inputs (predictors) and outcomes. They help us understand complex relationships across self-regulation components in a systematic fashion. As such, these approaches will allow researchers to explain and predict learning outcomes, by examining the pattern of relations between the different types of self-regulation strategies that students use habitually in a given domain (automaticity) and the effect of favorable and unfavorable learning conditions on their strategy use.

First panelist: Monique Boekaerts (Leiden University)
Monique Boekaerts, Leiden University, *Netherlands*

Teachers need tools that can capture students' successive attempts at self-regulation. These tools should be sensitive enough to provide information about the level of self-regulation that the students have attained. Teachers need this information in order to feed it back to the students when they discuss progress and to determine the zone of proximal development. Researchers need this information as well in order to study the pattern of relations between the different types of self-regulation strategies that students use habitually in a given domain (automaticity) and the effect that favorable and unfavorable learning conditions have on their strategy use. Are predictive approaches able to examine in detail the multiple elements of the self-regulation model in an integrated fashion? Are they able to link all the elements in the model to the objectives and expected outcomes?

Second and third panelist: Eduardo Cascallar and Tracy Costigan.
Eduardo Cascallar, Assessment Group International; Leiden University, *Belgium*
Tracy Costigan, American Institutes for Reasearch, Washington DC, *USA*

This presentation will describe the application of neural networks (NNs) in modeling self-regulation in the classroom. This machine-learning technique, developed to mirror human brain

processing, is an iterative process that is capable of discovering complex relationships and interactions in the inputs and outcomes. The goal of NNs is often to maximize classification accuracy, regardless of understanding the relative strengths of predictors. However, recent work has demonstrated that NNs in combination with more traditional statistical techniques can provide novel insights into complex relationships to identify which variables are driving the model (Costigan, 2003). We will present an introduction to NNs, including definitions, data requirements, and parameter settings. Included in the presentation will be a discussion of relative strengths and limitations, linking NNs in a sequential analytic chain to maximize modeling. We will also present a case example of this application in educational research.

Fourth panelist: Peter Nenniger
Peter Nenniger, University of Koblenz-Landau (Campus Landau), *Germany*

Any assessment of self-regulated learning is faced with a highly complex system of interacting elements which have to be regarded as the dynamics in the individual's autonomous regulation. Because of this complexity predictive assessment requires a description of the structural characteristics as well as of the functions of structural transformations. Although a structural approach may help, a comprehensive evaluation of the assessment concepts that are used is hardly possible, due to their diversity in elaboration and formalisation and due to the diversity and partial incomparableness of their underlying theoretical concepts. For this reason, I suggest that in any further development of predictive systems approaches emphasis should be given to the development of actual "systems" and that the respective implications should be examined. In addition, I would suggest to frame the differential assessment approach in a mode that encompasses the multiple facets of the phenomenon so that it can cope successfully with complexity.

M 2
31 August 2007 14:35 - 15:55
Room: 0.87 Marx
Paper Session

Research methodology

Chair: **Filip Dochy,** K.U.Leuven, *Belgium*

Meta-analysis for repeated measures designs in educational research – options and challenges
Hans A. Pant, Humboldt-University Berlin, *Germany*
Kai S. Cortina, University of Michigan, *USA*

In empirical educational research, meta-analysis is widely considered the most adequate statistical tool in establishing efficacy of interventions. Meta-analysis uses the summary statistics (effect sizes) from individual studies as raw data and analyzes the heterogeneity of effect sizes across studies. In educational research, key concepts like learning are time-dependent processes by definition. Hence, the evaluation of intervention effects or long-term trajectories inevitably requires longitudinal or repeated- measurement designs. However, until recently, the statistical models to deal with within-subject designs within a meta-analytical framework were based on unrealistic model assumptions. We review the core statistical problems and discuss current

approaches to solve them. All analytical steps and recommendations are illustrated with meta-analytical data on the effect of school type on student achievement gains. Recommendations for research practice will be derived.

Learning from book-based examples: Exploring the impact of combining fading with prompts and matrices
Robert Atkinson, Arizona State University, *USA*
Mary Margaret Lusk, Louisiana State University - Shreveport, *USA*
Brian Beitzel, State University of New York - Oneonta, *USA*

The purpose of this study was two-fold. One goal of this study was to explore whether the fading approach, which supports the transition from studying examples in initial skill acquisition to problem solving in later phases of the learning process, combined with principle-based self-explanation prompts can be successfully implemented in a book-based environment. Another goal was to explore whether the use of matrices can facilitate learning from example-based instruction by making the subgoal structure of worked-out examples and practice problems more salient. Ninety seven undergraduates were randomly assigned one of four conditions: (a) prompting + matrix, (b) prompting-only, (c) matrix-only, or (d) control (no prompting or matrix). The participants studied a pencil-paper instructional packet consisting of two sets of probability tasks presented via the fading approach before completing a posttest consisting of near and far transfer items. We found that participants assigned to the prompting-only produced more conceptually accurate solutions to near and far transfer problems than their counterparts in the control condition (fading only). As a result, we recommend that instructional designers consider the use of prompts that encourage learners to determine the principle that underlie the solution steps in worked-out examples. On the other hand, this study suggests that instructional designers should be cautions about employing prompts in combination with matrices in support of example-based learning since we found them to be detrimental to learning.

Video diaries, user requirements and interdisciplinary boundary-crossing
Richard Procter, University of Cambridge, *United Kingdom*
Vito Laterza, University of Cambridge, *United Kingdom*

Although video technology is now widely used by education researchers, characteristically for observation of teaching and learning environments, there has been very little use of video to illuminate the work of educational researchers themselves. In this paper we describe a novel use of 'video diaries' to illuminate the working practices of educational researchers working on projects within the UK's Economic and Social Research Council's (ESRC) Teaching and Learning Research Programme (TLRP). The specific purpose of this activity was to gather 'user requirements for software developers employed to develop and evaluate a Virtual Research Environment for Education under the UK Joint Information Systems Committee (JISC) Virtual Research Environments Programme. A series of two individual and two collaborative structured and semi-structured tasks were developed which groups of participants undertook themselves, having been provided with digital video cameras, tapes and instructions. Our findings show a positive and enthusiastic response from the researchers who were willing to engage with the tasks. The videos provided rich contextual information which supplemented other data sources (surveys, interviews and routine data collected online) and offered insights into individual and collaborative working practices in diverse institutional contexts. We describe specific instances of data collected and discuss advantages and disadvantages of this data collection 'at a distance', comparing it with other reflective approaches. We also describe how the video data act as 'boundary objects' and

provide a means of illuminating what Kinti and Hayward (2006) describe as internal coordination problems (between project participants) as well as potentially reducing the likelihood and severity of external coordination problems arising in the problem-space between education researchers and the software developers aiming to support and enhance their work.

A mixed methods design for a training on conversational coherence in video-conferences
Karin Schweizer, Technical University of Braunschweig, *Germany*
Manuela Paechter, University of Graz, *Austria*

From former investigations (Schweizer, Paechter, & Weidenmann, 2003) it is known that conversational coherence in video conferences is lower than in face-to-face settings. It is also known that there are several coordination mechanisms that enable group members to maintain conversational coherence in face-to-face settings which are restricted in video-conferences. Therefore, in the present study a training for the participants of desktop video conferences was developed. The experimental design comprised four conditions. We trained groups of three participants in (a) conversational coherence, (b) problem solving, (c) conversational coherence and problem solving or (d) we skipped the training at all (= control group) (in the present paper, however, the focus lies on the coherence training). The results show a relationship between the type of training and the enhancement of conversational coherence. The coherence coefficient was higher for the coherence training group than for the control group. Other training conditions show different results. Qualitative data further show that special patterns do develop with special types of training. The results yield useful implications for the design of group work in online courses. They give recommendations how to support knowledge communication.

M 3
31 August 2007 14:35 - 15:55
Room: 0.89 Jedlik
Paper Session

Assessment methods

Chair: **Kari Smith,** University of Bergen, *Norway*

Dynamic assessment of proportional reasoning: Human vs. computer-based mediation
Alex Kozulin, ICELP, *Israel*
Danielle Jackobson-Sapiens, Hebrew University, *Israel*

The goal of this paper is to explore students' proportional reasoning under conditions of human mediation as compared to computer-based mediation. The target of our dynamic assessment – proportional reasoning – is directly linked to mathematical problem solving and as such bridges between cognitive and instructional areas. Fifty three seventh grade male students (age 13-14) participated in the study. They were pre-and post-tested using a modified version of Harel et al (1992) Blocks task. In this task the students are shown two pairs of blocks (A,B and C,D), all bricks in blocks A and C weigh the same and all the bricks in B and D also weigh the same. The students are informed about the weight relation between blocks A and B and are asked to infer about the weight relation between blocks C and D. Students' answers were ranked from reasoning Level 0 ("wild guess') to Level 6 (fully proportional explanation). The first group of students

received human mediation based on classroom discussion, while the second group received a computer-mediated program. The comparison of pre- and post-tests demonstrated that mediation in both groups was effective in enhancing the level of proportional reasoning. The effect size of computer mediation was 1.4, the effect size of human mediation was 1.2. Though the students' proportional reasoning level was much lower than predicted by the classical Piagetian theory, a considerable reasoning potential was within the students' Zone of Proximal Development as revealed during a short (2 hours) mediation session. Computer-mediation turned out to be more effective than human mediation. At the same time different learning patterns were identified in these two forms of mediated learning. Students with identical pre-test performance demonstrated different learning potential thus confirming the educational value of dynamic assessment as compared to the static assessment paradigm.

Measuring the Sense of Presence in Mediated Environments: Utility of IRT
Sean Early, University of Southern California, *USA*

Item Response Theory (IRT) holds great promise for the creation and validation of scales measuring latent constructs. This paper describes the creation and preliminary validation of scale of the sense of presence in mediated environments. The field of presence research has struggled to develop a stable and valid measure of the construct in spite of intensive efforts. The results of the IRT model, based on a sample of 102 respondents, demonstrate good coverage over the expected range of values of the latent construct, good internal reliability estimates (Cronbach's alpha = .90; Person's Separation Index = .89). Results of promising preliminary evidence of construct validity are also described.

Using the SOLO taxonomy to assess assignments of novice university teachers
Jelle Geyskens, University of Antwerp, *Belgium*
Ann Stes, University of Antwerp, *Belgium*
Peter Van Petegem, University of Antwerp, *Belgium*

The present study wants to investigate whether the instrument we developed is capable of differentiating and classifying various assignments and what these differences in scores actually indicate. The instrument is based on the Structure of Observed Learning Outcome (SOLO) which gives a measure of the quality of a learning outcome (i.e., an answer to a question) in terms of the progressive structural complexity of that learning outcome. Two research questions are formulated. First, is the instrument capable of categorizing the assignments? Second, does the categorization (i.e., differences in scores of the assignment) reflect quality? To answer these questions we carried out a research to assess the assignments of 22 training participants. The training was developed for novice university teachers at the University of Antwerp. Two researchers used the instrument to categorize independently the assignments of the 22 subjects. The study shows that applying our instrument on the assignments results in a continuum of scores from high over medium to low. That is, the instrument is capable of differentiating and categorizing the different assignments. A comparison is made between the scores given by the SOLO-based criteria list and feedback on the assignment given to the participants (i.e., holistic judgement by two trainers). This comparison indicates that the two classifications show similarities, which suggests that the classification made by the SOLO-based criteria list is reflecting the quality of the assignments.

In search of mentor teachers' reflective moments
Frank Crasborn, Fontys University of Applied Sciences, *Netherlands*
Paul Hennissen, Fontys University of Applied Sciences, *Netherlands*
Niels Brouwer, Radboud University, *Netherlands*

This study investigates the extent to which mentor teachers experience reflective moments during mentoring dialogues. Any description of the phases of professional growth includes the degree to which explicit action goes hand in hand with deliberate consideration and thinking. There is little known about the thought processes of mentor teachers during their dialogues with students in the workplace. This study analyses 60 dialogues of experienced mentor teachers, both before and after they receive training in supervisory skills. Two methods of investigation are used: firstly, a stimulated recall interview following the dialogue, which traces reflective moments and secondly, a specially developed push-button device used to record these moments as they occur. During mentoring dialogues, the mentor teachers' behaviour comprises few reflective moments. Significantly, these occur more frequently after training. This seems to not only confirm the view that much of professional behaviour occurs automatically and instinctively, but also to support the premise that cognitive processes are important in the acquisition of supervisory skills. The combination of both methods of recording seems to make it possible to achieve a more accurate registration of the number of times these moments occur.

M 4
31 August 2007 14:35 - 15:55
Room: -1.64
Paper Session

New modes of assessment

Chair: **Tibor Vidákovich,** University of Szeged, *Hungary*

Reasoning from multidimensional evidence: What develops?
Jim Ridgway, Durham University, *United Kingdom*
Sean McCusker, Durham University, *United Kingdom*
James Nicholson, Durham University, *United Kingdom*

There is an intimate association between assessment and curriculum practice – narrow assessment results in a restricted curriculum. Our analysis of high-stakes examinations in statistics for UK students aged 17 and 18 years showed that students never work with more than 2 variables at a time. About 75% of available marks were awarded for statistical technique (Ridgway, Nicholson, and McCusker, 2006). Students are being taught a limited range of techniques that narrow their conceptions of reasoning from data, useless for dealing with anything but the simplest of data. In contrast, most curriculum subjects require students to consider a number of variables simultaneously. We have evidence that using new interfaces, students can engage in multivariate reasoning at an early age (Ridgway and McCusker, 2003). If students are to acquire these skills in school, it is necessary to understand something of the stages in reasoning from complex data, and the routes to the development of such reasoning. We took tasks from different levels in Watson and Callingham's (2003) hierarchy of statistical concepts, and extended the task collection to include ICT-based problems taken from the World Class Tests. The resulting tests were

administered to 196 UK students aged 13 and 14 years, from two schools, and the scores were subjected to Rasch scaling. We were able to show that: representative students can reason with multivariate data; ICT-based multivariate tasks are no more difficult than cognitively simpler paper-based tasks; the same cognitive processes do seem to be involved; and we can identify a number of stages of development that apply to both univariate and multivariate tasks. We will show the scale, and will describe the characteristics of student performances at different levels. We discuss the implications for policy, the creation of new curricula, and for assessment design.

Measuring attentional capacity of the learner
Risto Hotulainen, University of Helsinki, *Finland*
Helena Thuneberg, University of Helsinki, *Finland*

This study explored the efficiency of a new Attention Concentration Test (ACT) invented by prof. Ad van der Ven. The idea of the test is to reveal student's latent attentional capacities which most probably cannot be revealed only by observing superficial behavior. Identification of the attention and behavioral deviations, have so far been the main means of defining, for example, attention deficits. The ACT is based on the Inhibition theory which is based on assumption that during the performance of any mental task, which requires a minimum of mental effort, the subject actually goes through a series of alternating states of distraction (non-work) and attention (work). These alternating states of distraction (state 0) and attention (state 1) are latent states, which cannot be observed and which are completely unaware to the subject. During states of attention inhibition linearly increases with a certain slope a1, and during states of distraction inhibition linearly decreases with a certain slope a0. The inclination to switch from one state to the other is mathematically described as a transition rate which in turn is a measurable and accordingly computable process. The goal of this study was to challenge ACT and study if the ACT test result is related to a) teachers ratings, b) GPA, c) studied motivational variables, d) formal operations and e) future aspirations of the students. During spring 2005, 205 ninth graders in Finland participated to the study. The results showed that the ACT results did neither correlate with teacher ratings nor motivational variables which supported theoretical assumption related to the existence of the latent factor. However, ACT results correlated with students' GPA, formal operations, and future aspirations. In sum, these tentative results show that ACT appears to have potential to become an useful diagnostic tool, providing teachers with objective information about attention capacity.

Test-anxiety, intelligence and the mediating effects of response latencies
Tobias Dörfler, Bamberg University, *Germany*

With the increasing use of computer based testing psychological research becomes more and more interested in the meaning of response latencies in various test settings. Analyses of response latencies show that correct responses are given approximately 25% earlier than false responses – a general finding ("false > correct-phenomenon") which can be shown for different ability groups as well as for diverse test modes (ECT, complex tasks, non adaptive, adaptive) and several test domains (figural, numerical, verbal). Individual differences in timing behaviour and the impact of personality variables are less investigated. Aims of the present study are to shed light on (1) the generality and (2) individual differences of timing behaviour in a figural reasoning test and to (3) analyse the influence of basic personality dimensions (Big Five) on individual timing behaviour. Therefore, reasoning ability, timing behaviour and a detailed personality profile of 101 German high school and university students (70 females) aged from 16 to 53 years were administrated in a computer-based assessment. Results indicate that response latencies for correct answers are shorter

compared to those for false answers. This central outcome can also be found for different ability groups, brighter persons however invest more time when working on a pure power test. Additionally, mean response time seems to be an intervening variable between test-anxiety and performance in a power test. Based on these results it is suggested that test-anxiety as well as extraversion (although to a minor degree) are taken into account to provide better interpretations to all subjects and not to underestimate high anxious people in test-like events. Response latencies seem to be a new parameter which can easily be recorded in computerized testing environments. Further consequences for diagnostics of individual abilities in will be discussed.

Expressing mathematical beliefs in pictures and texts
Stefan Halverscheid, Univ. Bremen, *Germany*
Katrin Rolka, Univ. Dortmund, *Germany*

A design for investigating mathematical beliefs is presented as an alternative to the use of questionnaries. Firstly, students are asked to express their views on mathematics on a sheet of paper by drawing a picture. In a second step, they explain their work in a written text. Criteria for the assessment of this data are presented to identify Earnest's established categories for mathematical beliefs: instrumentalist view, Platonist view, and problem solving view. An interrater design is used to check on the reliability of the method. The raters were trained to interpret the children's work according to the suggested criteria on mathematical beliefs. Applied to a sample of 131 students, the method shows that an instrumentalist view appears more frequently among German students from grade 9 than among students of grade 5. The samples of grades 3 to 12 indicate that older students tend to identify their beliefs on mathematics more with their views on the teaching of mathematics than young children. Older students bring up their learning difficulties in their pictures and texts more frequently than younger students. This is typically accompanied by the expression of negative emotions like disappointment or frustration. The study of affects and the development of beliefs over the grades are promising features of this approach.

M 5
31 August 2007 14:35 - 15:55
Room: -1.62
Paper Session

Religious education and education for peace

Chair: **Kees van Putten,** University of Leiden, *Netherlands*

The meanings of 'Religion'. An empirical study on the differences in religious literacy among sixth-grade students and theology students.
Martin Ubani, University of Helsinki, *Finland*

The aim of this paper is to report the differences in the perceptions of religion among Finnish sixth-grade students and theology students. The paper based on empirical data. The first group in the study consists of 12-13 year old pupils (N = 101). The other group in this study are theology students majoring in RE in the University of Helsinki (N = 40). The data consists of 775 expressions given to religion by the sixth-grade students and theology students. The qualitative

content analysis revealed three distinctive domains concerning religion. They were called the institutional dimension, the supernatural dimension, and the humanistic dimension. In general, the meanings given to religion emphasised the institutional dimension among both groups. However, the study showed that the theology students perceived religion as a larger phenomenon than merely religious organisations and institutions. In addition, while the sixth-grade students focused on concrete institutional elements of faith traditions, the theology students were able to recognise personal spiritual elements from the traditional forms of religiousness. This study implies that the development of religious literacy and expertise shows as the broadening of personal horizon concerning religion.

The influence of feelings on cognitive achievement in religious education
Theo Van der Zee, Radboud University Nijmegen, *Netherlands*
Chris Hermans, Radboud University Nijmegen, *Netherlands*
Cor Aarnoutse, Radboud University Nijmegen, *Netherlands*

Taking a socio-constructivist perspective on knowledge and learning, the paper investigates the influence of feelings on cognitive achievement in religious education. The first aim is to find out whether feelings influence achievement and whether affective learning strategies make a difference in this regard. It is expected that feelings influence learning and achievement by focusing students' attention on agreeable things and deflecting it from disagreeable things and that affective learning strategies make a difference. The second aim is to find out whether students' characteristics affect the influence of feelings on achievement. It is expected that religious characteristics make a difference in this regard. To answer the research questions we used a quasi-experimental and a pre-test / post-test design with two experimental groups (N = 257). We used a questionnaire on students' characteristics, a questionnaire on feelings, the Cognitive Achievement Test (CAT) to gather the data. We conducted MANCOVAs and used a SEM technique (LISREL) to analyse the data. Results of analyses show that positive feelings, negative feelings and boredom all influence achievement, albeit in varying degrees. Results also show that belief in God and participation in religious practices actively affect the influence of feelings on achievement. Results are discussed with reference to theoretical assumptions (Pekrun et al., 2002). To explain the influence of feelings on achievement in religious education we discuss the model of Wynn (2005). With respect to the influence of students' characteristics results are discussed taking a socio-constructivist perspective on learning in religious education (Hermans, 2003).

Long-term effects of peace education programs in the context of intractable conflict
Yigal Rosen, University of Haifa, *Israel*

Peace education (PE) programs that take place in regions of ongoing conflict face socio-political environment that for many decades cultivated negative perceptions, attitudes, beliefs and emotions towards the adversary. Can PE programs stand a chance for changing the psychological foundation that fueled the conflict through the years? The present study examined the possible differential changes in central and peripheral beliefs as a function of Jewish and Palestinian youngsters' participation in a PE program. Furthermore, this study examined the durability of the educational impact on the youngsters and affectivity of an "induced-compliance" activity to achieve more long-term impact of the program. Nine hundred fifty six adolescents participated in this study: About a half of the youth participated in a yearlong school-based PE, when the other half served as a control group. Repeated measurement assessment based on self-report questionnaires implemented in this study. Findings showed that PE program could effectively influence adolescents' peripheral attitudes and beliefs, while the roadblocks of peace education pertain to the

core beliefs that stand in the center of the groups' collective narratives. However, peripheral attitudes and beliefs that are more easily affected by PE programs changed back as easily by adverse social and political influences. Additional finding was that an "induced compliance" activity which developed in the present study could promote more long-term impact of the educational influences of a PE program. The results of this study can promote better understanding of the possibilities and the limits of peace education within societies engaged in intractable conflict, and also the ways to overcome these limits.

Religious instruction - the robust stone base of successful education
Antti Rasanen, University of Helsinki, *Finland*

The aim of my presentation is to examine religious instruction in Finland. According to international comparisons the Finnish school system is top class. What kind of role RE has in the successful education? What do people expect of RE and how can a humanistic subject like religion fit the expectations? The research questions can be expressed in the following manner: (1) What do Finns expect of the RE teacher? The aim is to clarify what is the purpose of RE teachers' work is and what kind of personality s/he should be. (2) How would Finns implement RE in comprehensive school? This interesting issue was supposed to clarify what should be done in schools and how religion should be taught if should at all. The frame of reference of the study processes shortly the current RE situation in Europe. The research data are based on a survey, which carried out in the autumn of 2004. A total of 588 Finnish women (N = 364, 63 %) and men (N = 216, 37 %) participated in the survey. Research data was analyzed using factor analysis. The group differences are considered by gender, age groups, different kind of religiosity and regional differences. According to the results, the most important characteristic in teacher is that s/he could courage students to independent thinking. RE teacher should be an expert but because s/he is a RE teacher, some special characteristics are attached to her/him. It seems that RE has a received position among Finns. Finns endorse multidimensional RE. Attitudes towards Christian instruction were diffuse, which means neither strong refusal nor acceptance. Gender differences are in line with previous results about females' and males' concepts of RE.

M 6
31 August 2007 14:35 - 15:55
Room: 7.14
Paper Session

Mathematics education and problem solving

Chair: **Julianna Szendrei,** ELTE, *Hungary*

Exploring the current and future roles of Computer Algebra Systems in teaching mathematics at the university level – an international study
Zsolt Lavicza, University of Cambridge, *United Kingdom*

This study investigates mathematicians' views on the educational use of Computer Algebra Systems (CAS) to contribute information for the development of appropriate, successful and sustainable integration of CAS into university-level mathematics teaching. Furthermore, this research examines the factors that enhance or hinder the incorporation of technologies in entry-

level undergraduate courses. Computer Algebra Systems (CAS) are becoming widely available and are increasingly used in university-level mathematics teaching. However, little is known about the extent of CAS use in universities and the influences on the integration of CAS into undergraduate curricula. Based on interviews with a number of mathematicians, I developed a questionnaire study with two interconnected aims: firstly, to provide information about current use of CAS and secondly, to elicit mathematicians' views on the factors affecting CAS integration within mathematics departments. The study is cross-cultural in nature. I have sent the questionnaire to 4,000 mathematicians in Hungary, the United Kingdom, and the United States. Currently, I am analyzing the responses of more than 900 mathematicians. In my talk, I will outline models of current CAS integration in university mathematics teaching and characterise the views of mathematicians about the role of CAS in future mathematics teaching. My hope is that the developed models will assist in better understanding of present CAS-enhanced teaching practices and will contribute to the development of a warranted pedagogy for CAS and technology use in undergraduate mathematics teaching.

Algebra problem solving in relation with the numerical systems used by Mayan students' in the market: An ethnographic study
Moramay Micalco, University of Barcelona, *Spain*
Eduardo Marti, University of Barcelona, *Spain*
Merce Garcia-Mila, University of Barcelona, *Spain*

The present research aims at analyzing the psychological processes involved in the learning of basic algebra in a community (Mayan-Tseltal) that uses different numerical systems (decimal vs. vigesimal) depending on the context (school practices or community practices), and the years of schooling. More concretely, we address the identification of mathematics invariants (Nunes, 1992) such as the distributive and associative properties in applying basic algebra when Mayan (Tseltal) students solve problems situated in their community practices (Brown, Collins, Duguid,1989). We worked with six 15-16-year-old Tseltal-Mayan who live in the Guaquitepec community (Chilon, Chiapas). Three of these participants were schooled (more that 7 years of regular schooling) and three were nonschooled. The methodology used to develop this research is ethnographic.Video or audio recording was performed, according to what interfered least in the natural setting of the activity. Also, all participants were interviewed in order to get detailed information about the procedures and the numerical systems used. Taken cautiously, our preliminary results point at differences in the grouping strategies (related to associative and distributive properties) that Tseltal students apply when the approach problems in their everyday community practices according to whether they use a decimal or vigesimal numerical system. The decimal system is mainly used by schooled participants, which leads to a higher degree of abstraction in their strategies.

Developing inductive reasoning within the content of mathematics
Eleni Papageorgiou, Cyprus Pedagogical Institute, *Cyprus*

This study aimed at the designing and evaluating a teaching program for the development of students' inductive reasoning within the content of mathematics. The proposed program was based on Klauer's theory of inductive reasoning, which defines six types of inductive reasoning problems according to their reasoning and processing structures. Therefore, our teaching program emphasized the recognition of the different reasoning structures of the mathematics inductive reasoning problems and the cognitive strategies needed for their solution. This study was based on an experimental-control design and the six-week teaching program was implemented to the experimental group for two 40-minute teaching periods per week. A written test, comprised of 21

mathematics problems of the six different structures defined by Klauer, was used to test the effectiveness of the teaching program on sixth Graders' inductive reasoning mathematics problem solving ability. The data suggested that students' inductive reasoning could be improved within the teaching of specific mathematical concepts. Specifically, the results of the Structural Means Analysis showed that students improved their ability to solve all the six types of mathematics inductive problems. However, this improvement was significant only in the set of problems that were related with finding: (a) similarities of attributes, (b) differences in attributes, and (c) differences in relationships. Considering the positive effect of the training program on students' problem solving ability, this teaching program could be served as a tool in teachers' instruction and also as a prototype for further investigation of students' inductive reasoning within other curriculum subjects' areas.

M 7
31 August 2007 14:35 - 15:55
Room: 0.81 Ortvay
Paper Session

Cognitive development

Chair: **Jean-Luc Gurtner,** University of Fribourg/Switzerland, *Switzerland*

Does switching between cognitive strategies entail a cost?
Koen Luwel, Katholieke Universiteit Leuven, *Belgium*
Isis Bulte, Katholieke Universiteit Leuven, *Belgium*
Patrick Onghena, Katholieke Universiteit Leuven, *Belgium*
Lieven Verschaffel, Katholieke Universiteit Leuven, *Belgium*

It has been shown that several factors play a role in the selection of cognitive strategies (e.g., task features, subject characteristics, situational variables,…). However, one potentially important factor in this strategy choice process might hitherto have been overlooked, namely the cognitive cost of switching between strategies (i.e., the so-called strategy switch cost). Task switching and language switching studies have amply shown that a performance cost emerges when switching between two cognitive tasks or between two languages. The present study investigated whether switching between strategies within the same task would involve a similar cost. The task that we used in the present study consisted of judging numerosities of colored blocks in a 10 x 10 grid. Participants could either use an addition strategy (whereby (groups of) blocks are added) or a subtraction strategy (in which the number of empty squares in the grid is subtracted from the total number of squares). In Experiment 1, young adults were instructed to make judgements of all numerosities in the 'middle' range from 55 until 64 with either of both strategies on switch and non-switch trials by using a cueing paradigm. Results indicated that, as expected, participants responded slower on switch than on non-switch trials. Moreover, the extent of the switch cost seemed to increase as a strategy became less adaptive to the given numerosities. Experiment 2 generalized these findings to free strategy choices in the lower and the upper end of the numerosity continuum (between 10 and 19 and between 81 and 90, respectively) and revealed again that switching between strategies entails a certain cognitive cost. The theoretical and educational implications of these findings will be discussed.

A model of basic literacy for foreign language learning
Lynn Erler, Oxford University, *United Kingdom*

Findings from empirical research with middle school learners of French as a foreign language in England have revealed underlying problems with their basic literacy in French which may be due to the prevailing communicative language teaching methodology used by their teachers. In a series of projects carried out by the author of this paper it was found that key skills needed for decoding from written to spoken language were weak and that this virtual language impairment caused students to feel unhappy about learning the language (Erler 2004). This paper briefly reviews these findings and from them proposes a model of basic literacy when learning a foreign language. This paper represents a partial response to Bernhardt's (2005) call for a comprehensive a model of second language (L2) reading comprehension: the model conceptualises L2 reading processes at pre-lexical and lexical levels and includes the roles played by the L1 at this level. The model draws on work by connectionist theorists (Seidenberg & McClelland 1989) as well as traditional dual-route models of access from cognitive psychology (Eysenck 2001). The reading disabilities in French which result from students' deficits in basic literacy skills will be demonstrated in the proposed model and supported by findings from research with 12-year old students.. In the light of these respondents' self-report experiences and in conjunction with models of memory drawn from Baddeley (1986, Gathercole & Baddeley 2001) the potential usefulness of this L2 word access model for teachers and curriculum development will be argued.

Learning interactions with artificial intelligences: a fallibilist perspective
James Aczel, The Open University, *United Kingdom*

After many false starts, the potential advantages of artificial intelligence for education are starting to appear. It remains in question, though, whether current theoretical frameworks are adequate for understanding processes of learning with artificial intelligence. This paper re-examines a recent study of children telling stories in collaboration with a virtual conversational agent, in which it was found that children who played with the agent told stories with more linguistically advanced characteristics than the stories of children who played with a friend. Conventional explanations in terms of "scaffolding" or that portray the agent as a "tool" seems to have limited predictive potential. It is argued that a fallibilist philosophy offers the potential of new insights and testable hypotheses in relation to such learning interactions with virtual peers.

The development of the categorization ability in children age 8 to 12
Tatjana Taraszow, Knowledge Media Research Center, Tübingen, *Germany*
Yiannis Laouris, Cyprus Neuroscience & Technology Instituite, *Cyprus*

Categorization is fundamental in prediction, inference, decision making and in all kinds of interaction with our environment. It has also been suggested that categorization based on prototypes is the basis for human development, and that such learning relies on learning about the world via embodiment. Finally, categorization may also play an important role in the way the brain calls and engages schemata when interacting with, and integrating new knowledge. Despite its great importance, this mental ability has not yet been systematically studied using modern technologies. Although there are different theories that attempt to explain the underlying mechanisms we lack extensive developmental and correlation data upon which to base or to test competing theories. Within this context, the purpose of our study was to evaluate the ability of children of different ages to categorize different classes of objects. In addition, the study aimed to

search for correlations between this ability and other mental abilities, as well as with reading and spelling abilities.

M 8
31 August 2007 14:35 - 15:55
Room: 4.95
Paper Session

Learning and cognitive science

Chair: **Benő Csapó,** University of Szeged, *Hungary*

Learning from a complex multiple-representation display in an authentic context: Stepping out of the lab
Billie Eilam, University of Haifa, *Israel*
Yael Poyas, University of Haifa, *Israel*

We investigated students' ability to learn from multiple-representations display (MRs) in comparison to learning from a text-alone display (TR). The study novelty evolves from the examination of students' learning in the complexity of an authentic context (homework assignments) rather than in a controlled context. It also employed a rich complex MRs display, to resemble a textbook chapter. Students' learning was examined through their ability (a) to process information presented in the MRs display, and (b) to retain that information. The display complexity was expressed in the following factors: (i) numerous representations (18), (ii) representations of diverse types, (13), (iii) familiar and unfamiliar representation-types, and (iv) optimal partitioning of text and images in the display. Representations were presented on distinct cards to increase contiguity effect and enable a non linear processing, each MR card having a "twin" TR card. Three tasks were designed to involve students in learning through information manipulation, including the need to utilize all representations in the display, to employ various numbers of cards for each task, and to experience performance at different processing levels. A 32-item multiple-choice retention and processing test was administered 2 weeks after task completion without any notice. Appropriate analysis and coding systems were developed. Overall, for all the investigated aspects of the tasks and test, the performance of the experimental group students significantly surpassed that of their control group counterparts, supporting other reported findings despite differences in complexity and context. However, a closer look at specific questions revealed particular phenomena as visual tagging and use of anchor words, which students employed to overcome the task as related to the display difficulties. In addition, integration of unfamiliar representation-types was found to frequently offset the advantages of visual representations to learning. Such evidences have to be accounted for in the design of curriculum and instruction.

Does music improve or does it disturb memory processes?
Ewa Czerniawska, Warsaw University, *Poland*

The paper presents four experiments carried on in order to broaden knowledge about the role of music accompanying memory processes. The aim of the first investigation was to examine how different versions of the same musical composition (instrumental, Polish vocal, English vocal)

affect the recall of earlier memorised verbal material in English version. One hundred sixty one high school students were the subjects. The obtained results showed significant differences in recall between the instrumental and English, English and Polish and also instrumental and control groups respectively. Vocal music in English version decreased the amount of the recalled material while the instrumental music increased it. In the second and third investigation the same music and the same list of Polish words were used. The aim of the investigations was to check whether instrumental music – Mozart, Abba composition in instrumental version and unknown music (Chinese folk music) improve or disturb memory processes when it accompanies memorization (in the first investigation) or precedes recall (in the second). Both investigations were conducted in individual conditions with university students, respectively 100 and 80 subjects in the first and second investigation. The results showed that the influence of music is very weak, although in line with the hypothesized positive influence of Mozart and Abba, and a negative one of Chinese music. In the last investigation with 136 high school students, the effects of music preceding or accompanying memorization were the focus of interest. The investigation was conducted in groups with instrumental and vocal, English, versions of the same composition, and subjects were asked to memorize a list of English words. No significant differences were found between the groups. In the general discussion different mechanisms of the potential influence of music on memory processes are put forth: priming, Mozart effect, proactive and retroactive interference.

The influence of diagrams on chemistry learning
Jodi Davenport, Carnegie Mellon University, *USA*
David Klahr, Carnegie Mellon University, *USA*
Ken Koedinger, Carnegie Mellon University, *USA*

Do diagrams during instruction always improve learning? Well-controlled studies in cognitive psychology labs have shown that adding a picture to text increases performance on transfer tests (e.g., Mayer, 1999), and researchers have suggested that coordinating multiple representations can lead to deep conceptual understanding (e.g., Ainsworth, 2006). In the current study, we investigated whether diagrams would lead to improved learning when they are incorporated into a required homework assignment in a college chemistry course. Eighty-nine students were randomly assigned to read either a tutorial with molecular level diagrams (Diagram+Text condition) or a tutorial with identical text but no diagrams (Text-only condition). While students in both conditions made significant learning gains from pre to posttest on multiple choice questions ($p < .001$), their performance in Diagrams+Text condition was no different from their performance in the text alone condition on any of our measures: a multiple choice posttest, a problem solving activity, or transfer questions. These results suggest the large effects of diagrams commonly found in laboratory studies may be difficult to replicate in educational settings. Active and intentional coordination of representations may be required if diagrams are to increase learning.

Learning how to learn by concept mapping: A worked-example effect
Tatjana S. Hilbert, University of Freiburg, Educational Psychology, *Germany*
Alexander Renkl, University of Freiburg, Educational Psychology, *Germany*

A concept map consists of nodes representing concepts and links representing the relationships between the concepts. Various studies showed that concept mapping fosters meaningful learning. However, beginners' learning success in concept mapping is often poor. In order to help students to effectively use concept mapping for learning, they were given an introduction in successful concept mapping heuristics. Afterwards, in a learning-phase they either constructed two concept maps on their own (control-group) or had the possibility to study two heuristic examples that

modelled the process of concept mapping (example-group). A third group was additionally supported by self-explanation prompts (example+prompts-group). Conforming to the worked-example effect, in the control-group students' attention seems to have been absorbed by the mapping task while students in the example-based conditions had free working-memory capacities to focus their attention on learning successful concept mapping heuristics. This assumption is supported by the results of an exercise-phase. The example+prompts-group performed best in a post-test; however, the example-group only had a slightly better result than the control-group which achieved worst. Thus, the worked-example effect is also true in non-algorithmic domains – however, learners have to be encouraged to use their released working-memory capacities for learning.

M 9
31 August 2007 14:35 - 15:55
Room: 0.100A
Paper Session

Beliefs

Chair: **Marcel V, J. Veenman,** Leiden University, *Netherlands*

Construct consistency in the assessment of students' mathematics-related beliefs: a four-nation, cross-sectional factor-analytic study
Paul Andrews, University of Cambridge, *United Kingdom*
Paul Conway, University of Cork, *Ireland*
Jose Diego-Mantecon, University of Cambridge, *United Kingdom*
Peter Op 't Eynde, University of Leuven, *Belgium*

This paper reports on a comparative study of the mathematics-related beliefs of students in Belgium, England, Ireland and Spain. We draw on earlier work of the fourth author and his colleagues at the University of Leuven and the mathematics-related beliefs questionnaire (MRBQ) developed and trialled for use in Flanders. The original instrument, which was developed as a comprehensive and warranted measure of learner beliefs, yielded four factors predicted by the literature, although only two achieved satisfactory levels of reliability. The instrument was revised by the third author and his colleagues at the University of Cambridge and an analysis of data derived from students in England and Spain yielded four reliable factors each of which comprised at least two reliable sub-factors. The conceptual structures of these factors not only matched closely those derived in the Belgian trials but also offered evidence to support a conjecture that students' mathematics-related beliefs have a cross-national structural equivalence. Consequently, the country sample was expanded to include students at ages 12 and 15 from Flanders and Ireland. In this paper we report on the findings derived from the four country analysis. Factor and multivariate analytic approaches were applied to the data. The former tended to confirm the earlier findings of the two-way national study, that the instrument was comprehensive in its identification of the belief structures of students of mathematics and that these structures were consistent across countries. The latter highlighted the extent to which variation in the strengths with which beliefs are held are influenced by age, gender and nationality. Some implications in respect of further research, teacher education and teacher mobility are discussed.

Students' conceptions of assessment: Studies of New Zealand secondary students within the conceptions of assessment and feedback project.
Gavin T. L. Brown, University of Auckland, *New Zealand*
S. Earl Irving, University of Auckland, *New Zealand*
Elizabeth R. Peterson, University of Auckland, *New Zealand*
Gerrit H. F. Hirschfeld, University of Münster, *Germany*

This paper presents findings from three surveys (two small-scale, one nationally representative) of secondary students in New Zealand concerning the structure of their conceptions of the purposes of assessment. Data were analysed with exploratory and confirmatory factor analysis and acceptable fitting measurement and structural models to the data were derived. Preliminary analysis of the small-scale surveys has found up to eight different conceptions of assessment and discovered that self-regulation and formative assessment frameworks identify the conceptions that were most strongly related to student achievement outcomes. Students who used assessment to take responsibility for their learning achieve more than those who ignored assessment, blamed schools, or treated assessment as fun. Students associated self, peer, and interactive assessments mostly with fun and this may explain why formative assessment practices are not always successful. The paper will also report the as-yet-unanalysed results from the national profile of students' conceptions of assessment.

Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout
Sidsel Skaalvik, Norwegian University of Science and Technology, *Norway*
Einar M. Skaalvik, Norwegian University of Science and Technology, *Norway*

In this study we developed and factor analyzed a Norwegian Teacher Self-Efficacy Scale. We also examined relations between teacher self-efficacy, perceived collective teacher efficacy, strain factors, and teacher burnout. Participants were 244 elementary and middle school Norwegian teachers. The analysis supported the conceptualization of teacher self-efficacy as a multidimensional construct. We found strong support for six separate, but correlated dimensions, namely teacher self-efficacy related to instruction, adapting education to individual students' needs, motivating students, keeping discipline, cooperating with colleagues and parents, and coping with changes and challenges. We also found support for a strong second order teacher self-efficacy factor underlying the six dimensions. Teacher self-efficacy was conceptually distinguished from perceived collective teacher efficacy and external control (teachers' general beliefs about limitations to what can be achieved through education) which is often referred to as teaching efficacy. Strain factors were negatively related to collective teacher efficacy and positively related to teacher burnout. Collective teacher efficacy was strongly related to individual teacher self-efficacy. Collective teacher efficacy was also indirectly related to teacher burnout. This relation was mediated through individual teacher self-efficacy, which was strongly related to burnout. External control (or teaching efficacy) was not significantly related to burnout.

Mathematics teachers' beliefs and their impact on instructional quality and student achievement
Thamar Dubberke, Max Planck Institute for Human Development, *Germany*
Mareike Kunter, Max Planck Institute for Human Development, *Germany*
Nele Julius-McElvany, Max Planck Institute for Human Development, *Germany*

Teachers' beliefs about the nature of knowledge and the nature of learning and teaching are assumed to play a significant role in shaping their instructional behaviour. Empirical studies have

already shown that teacher beliefs influence students' achievement gains in elementary schools (e.g., Staub & Stern, 2002). However, it remains unclear whether and how these effects are mediated by the quality of teaching. This presentation examines the assumption that mathematics teachers' beliefs influence the quality of teaching, which in turn impacts students' learning. Longitudinal data were obtained from a sample of 155 classes and their mathematics teachers in the context of the German national extension to the PISA study (first measurement point in 2003/9th grade, second measurement point in 2004/10th grade). The results indicate that, first, two (negatively correlated) facets of teacher beliefs can be distinguished: a transmission-view and a constructivist-view. Second, two-level regression analyses showed that teacher beliefs were substantially associated with basic instructional features (cognitive activation and learning support). Moreover, a constructivist-view was associated with larger achievement gains, and these achievement effects were mediated by students' perception of cognitive activation in the classroom. To conclude, teachers' beliefs proved to be highly important in educational settings, and fostering constructivist orientations can be seen as a crucial element of teacher education.

M 10
31 August 2007 14:35 - 15:55
Room: 0.79 Jánossy
Paper Session

Motivation

Chair: **Anikó Zsolnai,** University of Szeged, *Hungary*

Achievement goals, metacognition, study strategies, emotions and achievement
Anneke Vrugt, University of Amsterdam, *Netherlands*
Frans J. Oort, University of Amsterdam, *Netherlands*

Self-regulation is an important aspect of student's learning in academic performance. The current study investigated which processes are characteristic of effective self-regulated learners. Research has suggested that effort expenditure and high achievement are characteristics of effective self-regulatory learning. We discerned effective and less effective self-regulatory learners based on effort expenditure and exam scores. In this study we not only included achievement goals, study strategies and achievement, but also metacognition and achievement-related emotions. We expected that effective self-regulated learners strongly pursue mastery goals, which would evoke metacognitive activities. The engagement in metacognitive activities would engender the optimal adoption of strategies to the requirements of the task. It was further expected that performance-approach goals would have a direct positive effect on student's use of strategies. However, performance-avoidance goals were expected to have a negative effect on their strategy use. Because it is generally assumed that the engagement in metacognitive activities is beneficial to learning and understanding, we expected that the engagement in metacognitive activities would evoke positive learning-related emotions (e.g. enjoyment), which would have a positive effect on the use of study strategies. Moreover, it was expected that the use of metacognitive study strategies, that provide information about the progress in learning, would evoke positive exam-related emotions (e.g. hope or pride). These emotions were expected to have a positive effect on exam scores. In order to investigate the relationships between the research variables, we applied structural equation modelling (Bollen, 1989), fitting the described model to the data of two groups:

a group of effective self-regulators, and a group of less effective self-regulators. The results strongly support the expectations.

Relationship among motivation orientations, metacognitive awareness and EFL listening comprehension
Isil Gunseli Kacar, Middle East Technical University, *Turkey*

This study investigated the relationships among motivation orientations, metacognition, and language achievement in EFL listening comprehension within the self determination framework empirically tested by Noels and collaborators (Noels, Clement, and Pelletier, 1999, 2001; Noels et al, 2000). In other words, it explored how the orientations proposed by self-determination theory related to metacognitive strategy use and proficiency in L2 proficiency in L2 learning, with a particular reference to EFL listening comprehension. 22 intermediate-level Turkish EFL learners in an academic setting participated in the study. Four data collection instruments were utilized in the study: a motivation questionnaire, tapping student responses to three orientations related to motivation: amotivation, intrinsic and extrinsic, a metacognitive awareness questionnaire, taping the metacognitive strategies students reported using when doing academic listening in English, a listening test, aiming to determine the level of learner achievement in EFL listening comprehension, and in-depth interviews with the participants on a one-to-one basis. Student responses on both questionnaires were correlated to determine any possible relationship between the three types of motivation and metacognitive strategies. Responses to the motivation questionnaire were also correlated with the learner achievement in EFL listening. In the analyses of the questionnaires, ANOVA was used while in the analysis of the in-depth interviews, which were recorded and later transcribed with the permission of the students, inductive analysis was utilized. Concerning the results of the study, students reporting a greater use of metacognitive strategies reported more motivational intensity, which provided some evidence to a self-determination continuum. The level of listening achievement in EFL did not correlate with amotivation. The correlations with intrinsic and extrinsic motivation were not as high as expected. The results supported the hypothesized links between self-determination theory, metacognition self-regulated learning, and learner autonomy empirically.

Towards a theory for primary cultural identity in instructional design
Michael K. Thomas, University of Wisconsin-Madison, *USA*
Marco Columbus, Cameron University, *USA*

This paper explores the notion of cultural identity in instructional design practice by way of a technology-rich innovation, Goree Island, a multimedia learning tool designed to leverage African American identity types in learning. The study made use of validated instruments that measure identity type and constructs related to academic motivation among African Americans. Results indicated that fostering a primary cultural identity among African American students is most likely to result in school success among members of this group too often associated with school failure. The paper further discusses the development of a theory-based approach to instructional design in which the systemic design of instruction is imbued with culture and that culture must inextricably permeate instructional design processes in ways that result in products that are culturally appropriate in both design and the content. It also discusses a theory-based approach to the implementation of such technology-rich innovations.

Students' interest for history and history instruction in Swiss 9th grade classrooms
Monika Waldis, Fachhochschule Nordwestschweiz, *Switzerland*

Interest for historical matters is an important objective of history education. The person-object theory (POI) of interest conceptualizes interest as a specific person-object relationship that is characterized by value-related and feeling-related valences. Krapp (2002) suggested that the emerging of feeling-related valences is closely related to the satisfaction of the three basic psychological needs identified by Deci and Ryan (2000). Feelings of competence, autonomy and social-relatedness are described to be essential to interest development. Theoretical models of interest development (Hidi & Renninger, 2006) identify situational interest as providing a basis for an emerging individual interest. The repeated engagement with particular classes of content over time may lead to a well-developed interest. Instructional conditions should facilitate both: The emerging and maintaining of situational interest by providing meaningful and personally involving activities and the deepening of well-developed interest by providing room for interest-related activities and challenging learning tasks. Building on this theoretical framework, this paper aims to highlight the relationship between students' historical interest and different features of history instruction in Swiss Secondary I classrooms (grade 9). Data collection for the present study included a sample of 90 classes and their teachers from the German part of Switzerland. Among the 90 classes, students' general interest in historical matters is average. Differences between school tracks and gender were found. The comparison of students' interest for historical themes and actual topics taught in the 9th grade classrooms reveals that boys' interest is better supported by current instruction. Students' perceptions of interest supportive teaching conditions are rather positive and show significant effects on students' general interest. Video analyses of interest-supportive conditions in current history lessons are under construction aiming to investigate the relationship between students' situational interest facilitated by instructional features and general historical interest.

M 11
31 August 2007 14:35 - 15:55
Room: 1.71 Pócza
Paper Session

Teacher education

Chair: **Fritz Oser,** University of Fribourg, *Switzerland*

Teaching competency of teacher training students. A video-analysis.
Corinne Wyss, School of Teacher's Education Zurich, *Switzerland*
Mirjam Kocher, School of Teacher's Education Zurich, *Switzerland*

The conventional Schools of Teacher Education in Switzerland as well as in the surrounding countries are in a changing phase. Teacher Education is part of a critical-controversial discussion and new ways and criteria for it are searched. With the definition of standards the quality of Teacher Education and the teaching competencies of the students should be secured. Indeed, the question, what competencies student (should) develop, is not clarified. The research project tries to approach and analyse the question which teaching competencies students acquire during their education. A longitudinal study reveals how the teaching competencies are changing with progressive Teacher Education. The coeval cross study identifies differences between the students (novices) and the teaching training mentors (experts). The analysis is proceeding on the base of videotaped lessons, which are taken during the initial teacher training.

Teachers as designers of inquiry-based interactive learning environments
Eleni A. Kyza, University of Cyprus, *Cyprus*
Constantinos P. Constantinou, University of Cyprus, *Cyprus*

Reform documents in science education emphasize inquiry as the primary context for learning science. However, it is reported in the literature that teachers face many challenges in implementing inquiry-oriented approaches and little attention has been given to how to prepare future or in-service teachers in this regard (Putnam & Borko, 2000). The purpose of this study was to (a) investigate the effect of a constructionist framework for introducing teachers to the design of inquiry-based learning environments on the development of teachers' understanding of inquiry, and (b) examine how the affordances of the web-based authoring tool the teachers used helped shape their understanding of inquiry. The participants consisted of ten certified or practicing teachers who participated in a graduate teacher preparation science course. The data included responses to questionnaires about the participants' definition of and prior experiences with inquiry at the beginning and at the end of the course, reflective diaries, where the participants were asked to document their reflections about inquiry and curriculum design, a collection of their design work, and end-of-course interviews with each participant. The data were analyzed qualitatively using an open coding scheme refined through the use of the constant comparative method (Glaser & Strauss, 1967). Preliminary analysis of the data indicates that, at the beginning of the course, the participants held normative but simplified views of inquiry while by the end of the course the participants provided more detailed characterizations of inquiry as a complex process. The examination of the participants' design phases indicated that a major challenge was how to translate theory about inquiry into a designed interactive curriculum, taking into account the affordances of the tool used. The course activities, which included relating the readings to the design task, frequent feedback and peer review, helped students move towards a more inquiry-based design.

Motivational practices perceived as useful by secondary preservice teachers
Sylvie Frechette, University of Quebec at Trois-Rivieres, *Canada*
Frederic Legault, University of Quebec at Montreal, *Canada*
Monique Brodeur, University of Quebec at Montreal, *Canada*

The study explores the preservice teachers' knowledge about motivational practices. Data was collected from 114 secondary preservice teachers in practicum through an open question protocol and some electronic discussion forums on motivation. Findings showed that motivational practices linked to task value beliefs were more frequently reported, followed by those linked to self-efficacy and control beliefs. Practices linked to learning goal orientation came last. The reported motivational practices will be commented upon according to the motivation model selected. Findings raise the issue of the appropriate combination of trainees' practices in order to effectively activate and sustain their students' motivation in specific educational settings.

The influence of personality and the perceived value of teacher training on the development of teacher efficacy and job satisfaction
Elizabeth R. Peterson, University of Auckland, *New Zealand*
Richard Hamilton, University of Auckland, *New Zealand*

This study seeks to investigate the relationship between students' personality, perceived value of teacher training and their teacher efficacy and collective teacher efficacy as they move from the training environment into the full time classroom and how these factors work together to affect job

satisfaction. Two cohorts of prospective teachers enrolled in teacher preservice programme completed two sets of questionnaires – one set during their teacher training (N = 123) and the second set was completed once they had started full time teaching (N = 58). A repeated measures MANOVA found a significant reduction in instructional strategy efficacy and perceived value of the teacher training from T1 to T2. Hierarchical linear regression analyses found that at T1 the personality trait intellect and extraversion were significantly predictive of the different types of teacher efficacy while instructional efficacy was significantly predictive of perceived value of teacher training. Hierarchical linear regression analyses at T2 found that a model which included all three teacher efficacy scales, intellect, and job satisfaction was significantly predictive of perceived value of teacher training (T2). At T2 only the personality trait intellect continued to predict classroom management efficacy and job satisfaction was found to be significantly predicted by collective teacher efficacy. Implications of these results are discussed for preservice teacher training, evaluation, and teacher support during their first year of full time teaching.

M 12
31 August 2007 14:35 - 15:55
Room: -1.63
Paper Session

Higher education

Chair: **János Steklács,** Teacher-Training College Kecskemét, *Hungary*

Personal epistemology of psychology, theology and pharmacy students: epistemological profiles
Minna Kaartinen-Koutaniemi, University of Helsinki, *Finland*

The aims of this study are to examine university students' epistemological profiles and to compare the consistency of the epistemological profiles among students representing three academic disciplines. The present study is part of the project with the idea to explore university students' academic thinking and personal epistemology. The aim of the research project is to understand and promote students' research and academic skills as a main goal of academic studies in the research-intensive University of Helsinki. In this paper, the individual profiles of students' personal epistemology have been investigated in more detail consisting of the comparison among students from three disciplines, psychology, theology and pharmacy. The student profiles have rarely been examined in the research on personal epistemology. In this study the student interview data (N = 87) has been analysed with qualitative content analysis in purpose to reveal students' conceptions of thinking and reasoning, that is, the beliefs and acquisitions of knowledge. The individual answers were examined and rated at the scale from naïve to relativistic thinking. As a result, the students represent qualitatively different profiles according to the categorisation of their answers. The main themes of the interview data were the criteria that students used to evaluate the quality and reliability of knowledge. Furthermore, the students described their experiences of requirements for thinking set by their academic context. According to the student answers, the three epistemological profiles emerged from the data. The profiles were entitled as a) naïve profiles; b) relativistic profiles consisting of the subgroups entitled "limited" and "sophisticated", and c) incoherent profiles. The categorisation of epistemological profiles was compared with variables such as age, major subject and study phase. The results showed that the epistemological profiles varied among students from different age groups, disciplines and study phases.

Quebec preservice teachers and their recourse to ICT on entering the profession: foundations and predictors
Francois Larose, University of Sherbrooke, *Canada*
Vincent Grenon, University of Sherbrooke, *Canada*

Aims In this communication, we shall state the results of a longitudinal study on the evolution of the relation to the pedagogical uses of information and communication technologies (ICT) made by four successive cohorts of students in the preservice teaching program at the University of Sherbrooke (Quebec, Canada), between 1998 and 2004. Our research is based on the social learning theory as taken up again and developed by Bandura and applied to the context of analysis of factors that influence the profiles of professional practices developed by Quebec preservice teachers. Methodology We conducted a longitudinal survey with successive convenient samples composed of all students in the preschool, elementary, and high school teacher education programs at the University of Sherbrooke. The inquiry was conducted in a recurrent manner over a period of 6 years with a sample totalling 3970 subjects. Findings Results of this study show that the level of computer literacy increased in a significant manner between 1998 and 2004. We observe, nevertheless, an impact of exposure to ICT courses offered to preservice teachers on their general attitude toward ICT. In addition, the exposure to ICT use by experienced teachers in the classroom determines the probability of computer use as a teaching tool in their teaching profile.

Variations in portfolio assessment in Higher Education and the potential of future use of technology
Olga Dysthe, University of Bergen, *Norway*
Knut Steinar Engelsen, University College of Stord/Haugesund, *Norway*
Marit Allern, University of Tromsoe, *Norway*
Anne Kristin Sjo, University College of Stord/Haugesund, *Norway*

Considerable changes in assessment have taken place in the wake of a major reform of higher education in Norway from 2002. One of the changes is the use of portfolio assessment, and the empirical basis for this paper is a nationwide survey study of portfolio practices conducted in 2006. Our main research question is the following: How do portfolios vary across disciplines and to what extent and in what respect can variations in understandings and practices be attributed to differences inherent in the disciplines or to difference in perspectives on learning and assessment? Our findings show systematic differences between different types of educational institutions, but also between disciplines within each institution. This raises questions of what conceptions of portfolios and what practices are considered useful and under what conditions. The findings also lead to a discussion of further developments of portfolios in higher education and we ask how the new web technologies may contribute to changing portfolio practices in different disciplinary traditions.

First state mandated tests in Germany: Teachers' view on the pedagogical relevance of performance feedback information
Uwe Maier, University of Education Schwäbisch Gmünd, *Germany*

This paper describes the teachers' view of the new compulsory testing-system in Baden-Wýrttemberg, one of the large states in the south-west of Germany. For the first time in spring 2006, public secondary schools were bound by law to administrate state-wide tests ("Vergleichsarbeiten") in up to three relevant subjects after grade 6. Beyond educational policy, there is only little empirical evidence on the overall effectiveness of school accountability systems.

Above all, scholars in the field of school improvement emphasize the gap between performance feedback from external tests and the internal processing of the feedback information. A crucial precondition to bridge this gap is the teachers' acceptance of state-wide testing as a useful instrument for improving schools. In order to assess this view on the pedagogical relevance of performance feedback information, we addressed 256 secondary schools. A representative sample of 307 teachers with classes in grade 6 completed the anonymous questionnaire. The analysis of the quantitative data revealed that teachers in secondary general schools ("Hauptschule") are rather open-minded about state-wide tests than their colleagues in intermediate ("Realschule") or grammar schools ("Gymnasium"). The teachers' perspective on the curricular alignment of the test also depends on school subjects. Only a part of the teachers in secondary general schools acknowledge the utilisation of performance feedback information for improving diagnosis and teaching strategies. The overall results suggest that, at this point in time, state mandated testing in Baden-Wýrttemberg can hardly initiate or support school improvement activities.

M 13
31 August 2007 14:35 - 15:55
Room: 0.99
Paper Session

Student learning in higher education

Chair: **Cees Terlouw,** Universiteit Twente, *Netherlands*

Polytechnic students' conceptions of learning and knowledge: how do they relate to the aims of education?
Kirsti Lonka, Helsinki University, *Finland*
Ava Numminen, Haaga Institute Polytechnic, *Finland*
Pekka Rantanen, Haaga Institute Polytechnic, *Finland*
Kai Hakkarainen, Helsinki University, *Finland*

Systems of higher education in Finland and other European countries have to cope with increasing numbers of students. From working life, undergoing rapid transformation emerge new challenges in training professional skills and competences. In order to meet these challenges, polytechnics need to focus on improving the quality of learning and instruction as well as providing an authentic and rich environment of learning. Although Finnish university students' study strategies and conceptions of learning have been intensively examined, there are fewer studies regarding polytechnic students' strategies and conceptions of learning. The purpose of the present study was to compare polytechnic students' (N=606) conceptions of learning and knowledge with those of university students (N=913). The study was based on an assessment instrument developed by Kirsti Lonka and her colleagues at the University of Helsinki. The self-report questionnaire used included 24 Likert-type items. The results of the study confirmed the existence of the same 8-factor structure among the polytechnic students as had earlier been identified in the case of the university students. Eight sum variables were constructed on the basis of the factor analysis. The analysis revealed that polytechnic students differed significantly from university students across all eight variables. The students of polytechnics differed mostly from students of humanistic sciences and least from law students. The former showed more practical study orientation and greater emphasis on the certainty of knowledge than university students. The latter indicated a

higher degree of reflective learning, strategic planning and belief in innate abilities. The results provide evidence that polytechnics have not yet found efficient and fruitful ways to getting rid of traditional classroom-centred and teacher-controlled pedagogical practices. The results are discussed in relation to desirable characteristic and ideals of learning and instruction at polytechnics.

Social and academic integration and study progress in a Problem Based Learning psychology curriculum compared to more traditional curricula
Sabine Severiens, Erasmus University/Risbo, *Netherlands*

A meta-analysis on effects of problem-based learning has shown consistent positive effects for skills, but non-robust effects for knowledge (Dochy et al, 2003). Effects of a PBL curriculum, however, may reach further than skills and knowledge. The present study aims to answer the research question; to what extent does a problem-based psychology curriculum differ from more traditional curricula in terms academic and social integration and study progress? 305 first year students from three different psychology departments completed a questionnaire on social and academic integration. A full-scale problem based learning environment is compared to 1) a learning environment that combines traditional and activating teaching methods and 2) a traditional learning environment. Results show higher average scores on academic and social integration in the PBL environment, meaning that students are more satisfied about the quality of contacts with their teachers and peers. After one year of studying, students in a PBL learning environment have obtained similar numbers of credits compared to students in more traditional environments. Because number of credits is an important indicator of retention, this result implies that retention levels are not higher in a PBL environment. It also means that the higher scores on academic and social integration in the PBL environment do not translate directly into a higher number of credits after one year of studying.

Approaches to learning and study skills of Turkish and American students in colleges of education
David C. Berliner, Arizona State University, *USA*
Nuray Senemoglu, Hacettepe University, *Turkey*
Gokay Yildiz, Memet Akif Ersoy University, *Turkey*
Elife Dogan, Mehmet Akif Ersoy University, *Turkey*
Kazim Celik, Pamukkale University, *Turkey*
Behsat Savas, Mehmet Akif Ersoy University, *Turkey*

The first purpose of this study is to compare the approaches to learning by students in colleges of education in the US and Turkey. The second purpose, should it be found that future teachers are using inappropriate approaches to studying, is to develop recommendations to improve those skills. It seems appropriate to repair the faulty study skills of novice teachers so that they can communicate to their own students better ways to learn. To accomplish these purposes data were gathered from 206 American, and 1100 Turkish college students who volunteered to participate in this study. The students were pursuing degrees in both elementary and secondary education. The over-sampling of the Turkish students was to allow for explanatory and confirmatory factor analysis to be sure that the Turkish version of the major instrument used to assess approaches to learning did not differ form the English language version. Although translated with great care, the factor analysis will insure that this first translation of the instrument into Turkish is successful. In this study the ASSIST (Approaches and Study Skills Inventory for Students) inventory was administered in both Turkish and English to teacher education students in the two countries. The ASSIST Inventory contains 67 statements. Respondents indicate their agreement or disagreement

with each statement, using a five- point Likert scale. The ASSIST measures students' approaches to learning primarily on three dimensions- -deep, strategic, and surface/apathetic. Three questions will be answered using both ANOVA and MANOVA for analysis: What are the preferred methods of study among Turkish and American students; do Turkish and American students differ in their approaches to learning; do approaches to learning differ as a function of demographic data, such as major in school or year of schooling. Analysis of these data is in progress.

Students' usage and tutors' intentions of coursework feedback
Stephen Merry, Staffordshire University, *United Kingdom*
Paul Orsmond, Staffordshire University, *United Kingdom*

Tutors' intentions, when they provide feedback, may not be accurately perceived and acted on by students. Furthermore, little is known about how tutors construct feedback and much of the feedback provided may have little effect on student learning (Higgins et al., 2002; Rust, 2002). This study concerns feedback provided to 15 Level 2 Biological Sciences students at Staffordshire University by 5 tutors. Semi-structured interviews were used to identify the circumstances in which each instance of feedback was provided, the tutor's intentions when providing the feedback and the students' perceptions and usage of that feedback. A phenomenological approach (Giorgi & Giorgi, 2003) was used to analyse the interview data. Additionally, copies of the documented feedback were examined and the style of feedback classified (Brown et al., 2003). Students' interpretation of tutor feedback was found to be highly individual. Students may be looking for particular things and this leads to interpretation and implementation differently to how the tutor intended. Analysis of tutor feedback styles indicates that developmental aspects of students' learning were rarely addressed. The majority of comments involved giving praise for what students had done in the present assignment, identifying errors in the assignment and correcting misunderstandings. Finally, tutors admitted that they had little real knowledge as to whether their feedback was useful to students. These findings suggest that tutors need to provide guidance to students regarding the use their feedback in order to make its meaning more explicit and also to raise students' awareness of the effect that their personal agendas can have on the interpretation of feedback. References available in the extended summary.

M 14
31 August 2007 14:35 - 15:55
Room: 0.100B
Paper Session

Comprehension of text and graphics

Chair: **Zoltán Tóth,** KLTE, *Hungary*

Collaboratively generated graphical representations as a means of fostering knowledge acqusition in the domain of business education
Carmela Aprea, University of Mannheim, *Germany*
Hermann G. Ebner, University of Mannheim, *Germany*

Learner-generated graphical representations (e.g. knowledge maps, mind maps, concept maps) are receiving increased attention in educational research and practice, mainly because they are deemed

to foster deep and meaningful learning. Moreover, contemporary scholars assume that the beneficial effects of learner-generated representations can be increased, if they are combined with collaborative forms of learning. To further investigate these suggestions within the domain of economics and business education, an experimental study with 169 business school students was conducted. In this study, cognitive achievements of subjects from three treatment groups (text plus experimenter-provided graphic group; individually mapping group, and collaboratively mapping group) were contrasted. The results of this study indicate that learner-generated graphical representations are of specific use for promoting long-term retention of central text ideas, and that their collaborative generation is particularly effective with respect to accuracy and elaboration of newly acquired knowledge. Furthermore, the collaborative learning setting is most profitable for students who can be considered as low-achievers in terms of prior economic knowledge.

Supporting collaborative learning with multiple external representations
Daniel Bodemer, University of Tübingen, *Germany*

Research on external representations mainly focuses on the support of either individual or collaborative learning processes. However, when external representations or representational tools are used to encourage understanding in collaborative learning settings, several interacting factors have to be considered. Therefore, two versions of a tool are developed that is designed to combine the advantages of implicit collaboration structuring and the support of individual mental integration processes during learning with multiple external representations. The two versions differ in (a) how explicitly they support individual mental integration processes and (b) if collaboration processes are structured according to representational guidance (representation-inherent features are supposed to suggest certain patterns of thinking, communication, and behavior) or group awareness (certain patterns of thinking, communication, and behavior are supposed to be suggested by the presentation of information about the learning partner or the group) principles. An experimental study is reported that examines the impact of the tool versions on collaborative learning processes and on individual knowledge acquisition. Preliminary results indicate that a parallel integration tool that is based on group awareness principles is most appropriate to consider individual and collaborative learning processes at the same time and thus encourage meaningful learning processes best.

Students' handling of tables and graphs in elementary and secondary school
Eduardo Marti, Universidad de Barcelona, *Spain*
Merce Garcia-Mila, Universidad de Barcelona, *Spain*
Fernando Gabucio, Universidad de Barcelona, *Spain*

Tables and Graphs are semiotic tools frequently used to represent complex information. Many science and mathematics school problems require the understanding and production of Tables and Graphs. These representational formats are commonly supposed to be transparent ways of transmitting information and consequently, they are not associated to the need to be taught explicitly. Contrary to this view, we claim that Tables and Graphs, as any format of representation (representational format), impose a set of semiotic and cognitive constraints that must be appropriated by our students to understand and use them adequately. The aim of the present study is to analyze the way primary and secondary school students (11- to 15-year olds) understand and produce Tables and Graphs. Each participant is required to a) build a Table from a list of data (concerning the heights of a students' sample) and a Graph from a Table; and b) interpret a Table and a Graph answering a set of multiple choice questions (with the data concerning the student's weights). Results show that the strategies to adequately produce Tables and Graphs improve with

age. The explicitation of the rules that govern the construction of Tables and Graphs seems the most important requirement for the students' success. Interpretation is easier than production, though our results show different levels of understanding from the more conventional ones to those that require a higher degree of inference. Results are discussed to show the semiotic and cognitive constraints involved in Tables and Graphs handling, and a set of age adjusted instructional guidelines is provided.

M 15
31 August 2007 14:35 - 15:55
Room: 1.60
Paper Session

Reading and writing

Chair: **David Galbraith,** Staffordshire University, *United Kingdom*

Analyzing discourse synthesis: A research study on the use of semantic information for collaborative writing in secondary education
Crina Damsa, Utrecht University, *Netherlands*
Gijsbert Erkens, Utrecht University, *Netherlands*
Jeroen Janssen, Utrecht University, *Netherlands*

Discourse synthesis refers to reading and writing activities within a specific type of writing task, which requires students to synthesize information from multiple textual sources and use it to write a new text. The main goal of this research was to reveal how groups of secondary education students make use of semantic information from multiple sources, while undertaking a collaborative writing task. Furthermore, this study sought to identify the degree in which meta-cognitive activities specific to the discourse synthesis process are reflected in the groups' chat discussions, during the execution of this task. Students performed a computer-supported writing task based on multiple textual sources. The preliminary and final group products of 10 groups (32 students), as well as the electronic discussions of the group members, were analyzed. For this analysis a semantic analysis instrument developed based on Kintsch and Van Dijk's (1978) semantic representation theory was applied. In addition, the quality of the group products was assessed using an assessment instrument. The results of the study offer an insight into discourse synthesis activities, such as selecting and integrating semantic information units. The results point to the quantity and the type of semantic information selected from sources, the criteria based on which this information was integrated in the new text, and how groups discussed these activities. Noticeable results are, for instance, the fact that groups synthesized the information selected from sources based on ideas rather than based on authors (sources) and created new conceptual connections among ideas form various sources; or that semantic information was integrated according to a content-based structure.

The relationship between literature reading and creative writing
Tanja Janssen, University of Amsterdam, *Netherlands*
Hein Broekkamp, University of Amsterdam, *Netherlands*

Although the ability to read literature and write creative texts seem to have common elements, little empirical research is available on the relationship between these two abilities. This study attempts to define and to reliably measure literary reading and creative writing ability and subsequently to determine whether a relationship exists between these two abilities. The participating 19 eleventh-grade students were selected from two extreme groups: 11 were known to be strong readers of literature, while 8 were known to be weak readers of literature. Each participant wrote 2 poems and 3 narrative texts. A few days later, each participant read 4 literary texts: 2 poems and 2 short stories. In an interview, participants responded to open-ended interpretation questions about the poems and stories they had read. The writing products and transcriptions of the reading responses were rated by different panels, each panel consisting of 7 independent expert judges. Analysis of variance indicated that agreement among raters was high and that individual students' performance relative to other students was fairly consistent among tasks, both for reading and writings tasks. As expected, the students a priori selected as strong readers outperformed the students a priori selected as weak readers both on the reading tasks and the writing tasks. Moreover, average reading and average writing performance appeared to be related even when accounting for the a priori selection. These results support our expectation that a relationship exists between literary reading and creative writing ability. Moreover, it shows that both constructs can be measured in reliable ways. These promising results justify further systematic research into the relation between literary reading and creative writing. Eventually, such research might result in indications how literature and writing curricula can be integrated in order to profit from the common elements of literary production and reception.

Text quality and writing processes while writing-to-learn
Carien Bakker, University of Groningen, *Netherlands*
Kees de Glopper, University of Groningen, *Netherlands*

In the present paper we will report analyses of experimental data on writing-to-learn. Our study adresses the relation between writing processes and text quality. Process data, measured both through think alouds and stimulated recall interviews, will be combined with measures of the conceptual content and organization in the texts that students have produced. We will analyze relations between the conceptual qualities of the texts (e.g. use and elaboration of target concepts, relationships with other concepts, 'newness' of concepts when compared with textbook content) and the frequency and nature of planning and reviewing processes. We expect that our analyses will shed more light on the assumption that knowledge construction is primarily driven by the metacognitive writing processes. Such analyses are not only of relevance for theories and educational practices of writing-to-learn. Our writing-to-learn data also constitue a new domain for analyses of the relationships between the temporal orchestration of writing processes and text quality. Research from this perspective has not yet dealt with writing-to-learn behaviours.

Observational learning and its effect on individual and dyadic revision quality
Elke Van Steendam, University of Antwerp, *Belgium*
Gert Rijlaarsdam, University of Amsterdam, *Netherlands*
Lies Sercu, Catholic University of Leuven, *Belgium*

Collaborative revision and writing is often advocated as an effective teaching method in writing education to help novice and inexpert writers to improve their revision and writing skills (MacArthur, Schwartz, & Graham, 1991; Rouiller, 2004). However, research has also pointed out that to increase the probability of success, dyadic revision should be guided (MacArthur, Graham, Schwartz & Schaffer, 1995). One form of structured instructional strategy which has proven its

effectiveness as far as learning-to-write and learning-to-revise is concerned is observational learning (Couzijn & Rijlaarsdam, 2005). In this paper we explore the effect of observational learning on dyadic revision in more detail. 250 EFL learners were assigned to two experimental conditions in which dyadic revision is the instructional method used to teach students how to revise a well-structured letter of application. In a first experimental condition students observed a 'mastery model' in which two expert revisors modeled how to revise a letter of application in English for contents and structure. In a second experimental condition two students learned how to revise a letter of application in a more traditional way i.e. by 'doing it themselves'. Instead of observing two other students revise a letter of application for contents and structure they revised the same letter with a peer. To determine which instructional method is more effective, students' revision skills were measured immediately after the experimental intervention either on the individual or on the dyadic level. Data were analysed using multilevel analyses. In addition to our main research question – namely, which instructional method is more effective as far as writing a well-structured letter of application is concerned - we also explored the interaction between the instructional method used and individual differences such as level of English, writing and reading ability and revision skills.

M 16
31 August 2007 14:35 - 15:55
Room: Harmónia
Paper Session

Computer-supported learning environments

Chair: **Tina Hascher,** Universität Salzburg, *Austria*

Reasoning through touch? Using haptics in life science education
Petter Bivall Persson, Linköping University, *Sweden*
Lena Tibell, Linköping University, *Sweden*
Matthew Cooper, Linköping University, *Sweden*
Shaaron Ainsworth, University of Nottingham, *United Kingdom*

The aim of the presented work is to investigate the impact of a visual and haptic (tactile/kinaesthetic) tool through an in situ evaluation focusing on learning and performance. The investigation has a combined qualitative and quantitative design, including analysis of knowledge tests, problem solving tasks and interviews. Visual representations of molecular structures and processes are widely used within molecular life science and these visual tools include representations on several levels, ranging from the macro level to the sub-microscopic and to the symbolic, such as mathematical and chemical symbols, charts and diagrams of chemical reactions. Traditional representations commonly require the user to mentally add information; this can be structural information, creating a three-dimensional model from a two-dimensional image, or procedural, connecting real-world phenomena to dynamic properties implicitly described in the representation. The increasing importance of visualizations in molecular life science is clearly reflected in the exponential growth in the number and range of visualizations in teaching and research literature, indicating how essential these visualizations are for understanding and researching molecular life science, a subject often perceived as very abstract. Our visualization system includes a combined visual and haptic model of a protein interacting with a ligand (small

molecule). The visual and haptic representations are combined in an integrated virtual reality environment, allowing the user of the system to explore the properties of the protein, feeling its interactions with the ligand. In the system one of the aims of the haptic feedback is to add more complex information to the representation. Through careful design it is hoped this will aid the understanding of the molecular processes without overloading the user. Our research has shown that there are time gains from using the system and, more importantly, that the students' reasoning is improved, moving towards more understanding of molecular dynamics and force concepts.

Argument diagrams and chat as internet tools for knowledge work and learning
Leena Laurinen, Department of Education, University of Jyväskylä, *Finland*
Miika Marttunen, Department of Education, University of Jyväskylä, *Finland*

In the study 17 secondary school students practised argumentation with Internet tools during two 90 minute lessons. In the first lesson they constructed an individual argument diagram on the question whether the production of genetically modified organisms (GMO) should be allowed. After reading three articles on GMO the students improved their individual diagrams. In the second lesson, the students engaged in dyadic chat debates on GMO and then reflected on the debate by constructing a collaborative argument diagram on their discussion. Finally, the students finished up their individual diagrams. The study seeks to clarify a) what kind of modifications did the students make to their diagrams after the debate and reflection, and b) to what extent are the modifications associated with the texts the students read, students' debate, and their reflection of the debate? The students' modifications were classified into 1) revisions and replacements, 2) counterarguments against existing arguments, 3) extensions, 4) new arguments or counterarguments broadening the topics of the debate, and 5) minor modifications (spelling corrections; compacted wording etc.). A majority (71 of 98) of the modifications changed the argumentative content of the diagram (categories 1, 2, 3, and 4) while 27 modifications were only minor in nature. From the 71 modifications concerning the argumentative content 12 were associated with the texts only, 15 with the students' collaboration only (debate and/or collaborative diagram), 30 with both the texts and collaboration, and 14 modifications were based on students' general knowledge of the world. The study suggests that reading followed by debate and collaborative working on argument diagrams not only encourages students to elaborate their previous ideas but also helps them to create new ideas and arguments.

Scaffolding online dialogue though playing games or labelling: Is labelling redundant when playing a HipBone game?
Eva Mary Bures, Bishop's University, *Canada*
Philip Abrami, Concordia University, *Canada*

This paper examines two approaches to structure students' online dialogue --- labelling and HipBoneGames. The labeling feature allows students to insert phrases such as 'Building on your point' directly into their online messages. In HipBoneGames (Cameron, 2005) students play on a board with pre-determined links. This study looks at whether students choose to use labels less often when engaged online in a HipBoneGame than a free-flowing discussion. This study also explores the nature of the online dialogue and students' reactions to HipBoneGames as compared to free-flowing discussions, both in a context where labeling is available and also where it is not. For the first study, students are in cycle two, n=37; for the second study, students are pre-service teachers (cycle one). Results revealed that students tended to use labels less often when playing the games than during the free-flowing discussions. Students tended to find the games interesting, more relevant, and the expectations more clear; on the other hand, they found them somewhat

complicated. Students made links systematically according to the board, unlike in the free-flow discussions where they would sometimes post more individual postings. Students also participated more evenly in the HipBoneGames. The second study provides triangulation and also demonstrates the evolution of the games. The pre-service students have expressed similar reactions as to the graduate-level students. Notably, students now regularly play on a popular student-created board. Confusion still exists over how to play the games until they are actually playing them, this despite many changes including a checklist and a simplification of rules. This study indicates that labeling was rendered redundant when playing structured games, suggesting that features built into the software should be implemented flexibly. This study also illustrates that HipBoneGames are another possible approach to structuring online dialogue.

Authentic information gathering in reflective portfolio development process
Antti Syvanen, University of Tampere, *Finland*

The reflective learning has been recognized as means for closing the gap between theory and practice. The aim of the research project is to study authentic information gathering and knowledge acquisition as forms of reflective activities in personal portfolio development. The academic year of 2006-2007 14 prospective history teachers at University of Tampere, Finland are developing a personal digital portfolio. ProBlog mobile blogging prototype tool is used to facilitate the opportunities to record, store and share their training experience in personal weblog on-line environment. The content accumulated in the personal on-line weblogs is the material to be processed into a product portfolio –a paper document to be handed to the supervising teachers for end evaluation. The students have reported the use of weblogs as meaningful, although the link between the process and product portfolios was unclear to them. The students regarded especially commenting each others experiences in weblogs very useful. However, at this stage the mobile blogging still needs some development both in technical and pedagogical terms. To the students it seems to be interesting but still as a concept unclear. The mobile tool needs to be more flexible to give room for personal preferences in blogging, e.g. it should enable storing blog entries also privately on-line.

M 17
31 August 2007 14:35 - 15:55
Room: 3.67 Békésy
Paper Session

Technology in education and training

Chair: **Rainer Bromme,** Universität Münster, *Germany*

Implementing Information and Communication Technology in vocational schools: From designed to actual practices in teacher education
Isabelle Probst, University of Lausanne, *Switzerland*
Michele Grossen, University of Lausanne, *Switzerland*

In this paper, we draw on data collected (1) in a Swiss project aimed at promoting the implementation of ICT in vocational schools. This national project involved 23 Swiss vocational schools and more than 100 teachers. Our aim is to address the issue of teacher education in the

field of ICT by drawing on socio-cultural psychology and other strands related to the study of cognition in context. More specifically, our aim is to show that identifying the actual practices that the various schools developed to train their teachers can help us to capture the specificities of teacher education in ICT. Our research design included the collection of various types of data: observations of training courses and meetings of the school teams, documents used or produced in these contexts, interviews with the teachers' trainers, the project managers and the teachers, as well as questionnaires filled by the teachers. After having briefly described the context of this national project, we shall first present the characteristics of the training setting that was initially planned by the project managers. Then, we shall point to the obstacles and difficulties that the actors faced in the implementation process. We shall highlight the solutions that the different schools found in order to overcome these difficulties, the way they managed unexpected events and the way in which they gradually adapted the planned training setting to fit their own scopes, needs, resources and constraints. Finally, we shall show that this contextualisation process led to the development of original forms of teacher training and discuss their characteristics. In conclusion, our results emphasise the importance of taking into account the actors' actual practices when designing a training setting in ICT. (1) in collaboration with Barbara Fiorilli, Elvis Mazzoni, Jean-Francois Perret and Carlo Tomasetto

Student and teacher negotiations in a Media and Communication Studies classroom
Thomas de Lange, InterMedia, University of Oslo, *Norway*
Andreas Lund, InterMedia, University of Oslo, *Norway*

Vocational Media and Communication Studies have in recent years been added to the Norwegian national curriculum, a subject that still is taking shape as new technologies are applied to and co-evolve with classroom practices and, in particular, production oriented activities. Thus, we see emergent practices, often driven by requirements for solutions to ill-defined or new problems and challenges. In this situation we have observed how learners and teachers approach and negotiate challenges that are linked to production assignments. Our paper is a case-study focusing on how learners and teachers in an Upper Secondary School position themselves when facing a seemingly unsolvable task. Methodologically the study is based on an ethnographic approach with 51 hours of video recordings as the main empirical corpus. Theoretically our study is based on Cultural Historical Activity Theory that affords a multilevel analysis connecting classroom interactions with a longitudinal and institutional perspective. Our analysis suggests that institutional demands tend to be poorly aligned or even at odds with student strategies in media production. Our findings also imply that the school subject of Media and Communication Studies opens an opportunity for students to draw on knowledge and experiences partly developed in out-of-school practices. Our aim is to contribute to a deeper understanding of how Cultural Historical Activity Theory can be applied to analyzing classroom practices where two activity systems (teachers' and learners') are involved. On a more practical level we aim to examine the competencies that are needed to take on new or unexpected challenges and, thus, serve knowledge advancement.

The role of e-mail communication in fostering knowledge creation in a teacher training course designed in a collaborative learning environment
Helga Dorner, University of Szeged, *Hungary*

The Knowledge-Practice Laboratory (KP-Lab) project is coordinated by the University of Helsinki and EVTEK University of Applied Sciences. The general objective is to facilitate "innovative practices of working with knowledge in education and workplaces" (Hakkarianen, K., Ilomäki, L., Paavola, S., Muukkonen, H., Toivianen, H., Markkanen, H., and Richter, C., 2006, p.1). The

theoretical innovation is based on the "trialogic knowledge creation approach" (Hakkarianen et al., 2006, p.2), which refers to the collaboratively developed and shared objects of activity. Our research is linked to the first stage of the general research schedule. It investigates the co-operation of a group of teachers, researchers and developers in a collaborative learning environment created by the Moodle course management system. We examine how the medium e-mail and the forum are integrated in the processes of designing course materials and practicing pedagogy in an authentic learning environment. We intend to investigate how the participants use them in order to find out which forms of use may help a learning community in teacher training. Regarding the data collection we focus on the interactions between the participants on personal and social level. We apply both qualitative and quantitative methods to analyse the interactions, we gain quantitative data from the analysis of the log files as regards the individuals' activity on Moodle. We use online questionnaires supplemented by interviews about individual vs. collective aims, the usage of the medium e-mail and forum, and the co-operational strategies. We carry out a qualitative discourse analysis of the texts of the interactions guided by Fairelough's (1995) three-dimensional framework of critical discourse analysis. The present study is related to work of the Research Group on the Development of Competencies, Hungarian Academy of Sciences - University of Szeged.

M 18
31 August 2007 14:35 - 15:55
Room: 2.54 Novobátzky
Paper Session

Professional development

Chair: **Marold Wosnitza,** Universität Koblenz-Landau, *Germany*

Theoretical and practical knowledge revisited
Michael Eraut, University of Sussex, *United Kingdom*

This theoretical paper follows a series of empirical studies on professional learning in workplace settings, whose main aim has been that of finding out how best to develop potential for enhanced learning in those settings. The paper argues that: (1) A much wider range of theories are present in professional practices, their rationales and justifications, than is usually acknowledged; and that their absence or use needs more careful attention. (2) The sharing of practice is constrained by the significant role played by tacit theories and tacit knowledge of practices, by differences of understanding and perspective created by different prior learning trajectories and by deceptive discourses resulting from power relations in most workplaces. (3) Reductionist representations of complex professional practices, which fail to do justice to their complexity or to recognise the significance of differences in clients and contexts, also present obstacles to professional learning. Acceptance of these arguments suggests that different approaches to enhancing learning in the workplace will need to be considered. These arguments will be supported by references to empirical research by the author and other researchers, and several examples will be used to back the arguments. There is little space for such references and examples in the proposal, which is focused on the arguments themselves.

Construction and validation of an instrument for assessing feedback cultures in organisations
Katrin Kahmann, University of Regensburg, *Germany*
Regina H. Mulder, University of Regensburg, *Germany*

Feedback culture is supposed to have an effect on organisational outcomes. Assessment of feedback culture is valuable to organisations. We developed an assessment instrument for measuring feedback culture. Therefore a questionnaire was developed and analysed to assess the feedback culture of an organization (FBCQ). The instrument has 46 items. Factor analysis (N = 128 employees) yields three factors: 1) feedback quality, 2) importance of feedback and 3) support for feedback use. Regarding criterion validity we found satisfactory results for affective organisational commitment. Our results suggest that, validated with regard to central psychometric properties, the FBCQ allows a standardized and efficient measurement of feedback culture in organisations.

Teachers' interactions and their collaborative reflection processes during peer meetings
Dineke Tigelaar, Leiden University Graduate School of Teaching, *Netherlands*
Diana Dolmans, Maastricht University, *Netherlands*
Paulien Meijer, Leiden University Graduate School of Teaching, *Netherlands*
Willem de Grave, Maastricht University, *Netherlands*
Cees Van der Vleuten, Maastricht University, *Netherlands*

Teachers' reflections are often narrowly focused on technical questions ('how to') and less on the underlying moral, political and emotional aspects of their functioning. However, for a better understanding of teaching practice it is important to uncover beliefs and values that usually remain implicit. Meeting with others is considered crucial for enhancing the quality of teachers' reflections. However, little is known about how any beneficial effects of such meetings are brought about. We explored the relationship between medical teachers' interactions and collaborative reflection processes during peer meetings. Five experienced teachers and a teacher trainer participated in the study. Three peer meetings were videotaped and transcribed. Teachers' interactions and collaborative reflective processes were analysed. The interactions promoted reflection not only on technical questions but also on moral, political, and emotional issues. 'Guiding/directing', 'proposing an alternative' and 'exploring an alternative' appeared to be the principal interactions. The results may be useful for teachers and trainers who are considering organising and/or improving peer meetings.

Experienced teachers' perspectives of curriculum reforms and professional development in mathematics
Shirley Yates, Flinders University, *Australia*

Failure of curriculum reforms in mathematics is a significant problem worldwide, which has implications for classroom teachers and the learning potentials of their students. However, few studies have investigated teachers' perspectives of curriculum reforms in mathematics and the professional development (PD) associated with the reforms. The poor history of reform in mathematics has been attributed to a lack of congruence between the intent of curriculum innovations and teachers' pedagogical knowledge, beliefs and practises (Cuban, 1993). Although teacher PD is seen the panacea of reform efforts (Elmore & Burney, 1997) and integral to improvements in teacher quality (Borko, 2004), understanding the breadth, depth, and nature of teachers' learning experiences remains limited (Scribner, 1999). The present study examined 350 experienced elementary and lower secondary South Australian teachers' perspectives garnered

over multiple curriculum reforms in mathematics, the PD they had encountered in relation to the reforms and their views of how reforms should be introduced in the future. The survey indicated that teachers held very strong views about the reforms they had experienced, the manner in which the reforms had been imposed by educational authorities and the marked lack of PD which accompanied them. Teachers unanimously expressed the view that timely, effective PD which is well resourced, supported by their employer and situated within the classroom context is integral to the success of reform initiatives. The challenges posed by the PD needs teachers identified must be addressed by educational communities if curriculum reforms in mathematics are to be implemented more effectively in the future.

M 19
31 August 2007 14:35 - 15:55
Room: 0.83 Eötvös
Paper Session

Beliefs, self-regulation and instructional design

Chair: **Alexander E. M. G. Minnaert,** Rijksuniversiteit Groningen, *Netherlands*

Preparing pre-service teachers on-line for self-regulated learning
Bracha Kramarski, Bar-Ilan University, School of Education, *Israel*
Tova Michalsky, Bar-Ilan University, School of Education, *Israel*

This study focuses on pre-service teachers' engagement in metacognitive activities while preparing a teaching unit in the course Methods and Practice in teaching. The study compares the effects of the metacognitive engagement on pedagogical knowledge and self-regulatory behavior under two conditions: On-line metacognitive engagement (OME), and face-to-face metacognitive engagement (FME). Both groups were exposed to the same metacognitive activities based on using self-questions that serve as cues for setting goals, planning, monitoring, and evaluation (e.g., Kramarski & Mevarech, 2003). However, the groups differ in the way of engagement in learning. The OME group was encouraged to search on-line for the course demands, and resources for solving their tasks, and the FME group was taught face-to-face by the teacher. Participants (n=95) were asked to perform a pre/post SRL questionnaire, to plan a lesson, and to reflect by writing on the process of their planning and using meta-cognitive questioning. Results indicated that at the end of the study the OME group outperformed the FME group on various components of SRL behaviors: Cognition, metacognition, and motivation. They also reflected more easily on their regulation of cognition by focusing on planning, monitoring, debugging and evaluation processes. In addition, they exhibited more pedagogical knowledge based on designing a lesson unit by setting learning goals, and planning activities. The practical and theoretical implications of preparing pre-service teachers online will be discussed at the conference.

Game based learning and metacognition: working with quantitative metacognitive feed-back based on subjective probability without loosing the game play
Jean-Loup Castaigne, University of Liege, IFRES, LabSET, *Belgium*

With the success of computer and video games, educators develop interest in using the motivational aspect of games for educational purposes. Mixing educational objectives without

loosing the gaming experience is a hot topic of research and development. The E.U. ELEKTRA project aims to develop a game including a pedagogical background and a rich technological environment game in terms of visual design, interaction possibilities, and storytelling. One of the pedagogical challenges is the support of metacognitive activity, including the use of certitude degrees. In the game the learner-player will have to solve enigma gaining knowledge and understanding about eclipses, the theme of the game. The player will also have to gain the confidence of a non playing character. It is that confidence that will be measured with certitude degrees about solving the enigma. This paper will present a proposition for mixing metacognition and game play. It will also present an experiment regarding the formulation of the certitude on a scale to be used by the player. It was suggested not to use verbal expressions (like sure, not sure,...) but to use subjective probabilities (like 100%, 80%,...) instead. We organised an experiment proving the lack of reliability when using verbal expressions. In this experiment 23 subjects passed a double writing test about grammar in their native language. They were asked to write down a spoken missing word to be written within a typed sentence and to associate their certitude having the correct spelling. The first time they used a verbal expressions to describe their certitude. The second time they used subjective probabilities. The experiment showed that verbal expressions can take different values from person to person but also from question to question for the same person. The metacognitive activity will be based on dialogues based on the good use of those judgements.

Periodical workplans in mathematics - a valuable tool or a risky experiment?
Ole Kristian Bergem, University of Oslo, *Norway*

Abstract: The aim of this paper is to analyze the use of periodical work plans in six Norwegian 9th grade mathematic classrooms, and in the light of socio-cultural theories to discuss some important pedagogical issues about the concept of learning that the use of these work plans seems to raise. The research design is a classroom study involving three subjects; mathematics, science and language art, with video recordings from the classroom, student and teacher interviews, and ethnographic observation as the primary data sources. My first level of analysis is based on a common framework with categories elaborated for coding video observations of teachers' activities and instructional repertoires across sites and school subjects. My second level of analysis is based on the student/teacher interviews with specific regard to strategic positioning regarding the use of work plans in mathematics. An important consequence of the use of work plans is that a large part of the time allocated to mathematics is used on individual work. This seems to reduce the opportunities for student cooperation and the time available for open class discussions and/or discussions with peers. I have argued that learning consequently is being privatized and treated as a private endeavour. This is a view of learning that seems to conflict with a Vygotskian, socio-cultural view, where the importance of viewing learning as a social and cultural process is advocated. The student/teacher interviews revealed that the strategic positioning towards the use of work plans varied considerably both between students and between students and teachers. Most importantly there seemed to be a contradiction between the object/motive of the teachers and the object/motive of many students as regards the use of work plans.

Assessing metacognitive competence: Developing potentials for learning to learn
Therese Nerheim Hopfenbeck, University of Oslo, Faculty of Education, *Norway*
Svein Lie, University of Oslo, Faculty of Education, *Norway*

Research shows that self-regulated learners seem to be able to plan their learning, set goals, monitor and control their own learning process. Yet, researchers realize that most classrooms are

still populated with students who are not self-regulated. If students are expected to develop more of their potential for learning through being more self-regulated, autonomous and independent, we need more research investigating how students can develop metacognitive competences as a part of the learning process. PISA (Programme for International Student Assessment) is a large-scale international assessment project, which aims to measure students' competencies in Science, Mathematics and Reading. In addition it contains a student questionnaire measuring students' cross curricular competencies, such as learning strategies, motivation and interest in school subjects. In Norway we have developed 13 new items measuring what kind of learning strategies students claim to use when preparing for taking a test in science. The construct has been included in the Norwegian PISA study as national options. The constructs have been reliability tested, resulting in alpha values over 0,75. Three constructs measure how students prepare for a science test, and students are given questions regarding elaboration strategies, control strategies and monitoring strategies. 5000 students in Norway have been tested during the spring 2006. In addition, 22 students have been interviewed about their understanding of the learning strategy questionnaire. Results from the national options regarding students' use of learning strategies will be discussed based upon the idea that metacognitive awareness may increase both students' achievement level and their understanding of learning. Suggestions will be given for how questionnaires can be used to help students develop their potential for learning to learn.

N 1
31 August 2007 16:00 - 17:20
Room: -1.62
Paper Session

Assessment and evaluation

Chair: **Filip Dochy,** K.U.Leuven, *Belgium*

Student conceptions of feedback: A study of New Zealand secondary students within the conceptions of assessment and feedback project.
S. Earl Irving, The University of Auckland, *New Zealand*
Elizabeth R. Peterson, The University of Auckland, *New Zealand*
Gavin TL Brown, The University of Auckland, *New Zealand*

This study investigates New Zealand secondary students' conceptions of feedback, as part of a larger study of teacher and student conceptions of assessment and feedback, and their impact on learning outcomes. We conducted five student focus groups, and sought student beliefs and understandings around three key aspects of assessment and feedback – definition, purpose and personal impact/response. The students felt that feedback was the critical link between assessment and learning, and that it did not stand distinct from either. In addition, they were clear about what counted as feedback, and what did not. The nature of the feedback they received also impacted on their views of the assessment, especially whether the assessment could be considered as irrelevant. The data from the focus groups was used to develop 55 items for a conceptions of feedback instrument (CoF-I), which was piloted with 256 students. Exploratory and confirmatory factor analysis of data from the pilot study revealed the presence of six different components: feedback comes from teachers; feedback motivates me; feedback provides information; feedback is about standards; qualities of good feedback; and, help seeking. In addition, Samejima's Graded Response model was used to select items with optimal measurement characteristics for a second administration with a larger sample. In a second survey, the 47-item CoF-II was administered to over 800 students from a nationally representative sample of New Zealand schools. A further 250 students completed the questionnaire and also provided standardised measures of curriculum based learning in either reading or mathematics (viz., asTTle - Assessment Tools for Teaching and Learning). This paper will also report on the results of the yet-to-be analysed data obtained in this national study.

Students' conceptions of learning: Studies of secondary students within the conceptions of assessment and feedback project.
Elizabeth R. Peterson, University of Auckland, *New Zealand*
S. Earl Irving, University of Auckland, *New Zealand*
Gavin T. L. Brown, University of Auckland, *New Zealand*

This study investigates New Zealand secondary school students' conceptions of learning in a pilot sample of 236 secondary students and then in a larger nationally representative sample of over 800 secondary students. Items from Purdie and Hattie's (2002) Conceptions of Learning Inventory and student focus group data was used to construct the 58 item conceptions of learning questionnaire (CoL-I). Exploratory and confirmatory factor analysis conducted on the pilot data revealed seven different conceptions of learning including learning is: gaining knowledge; increasing understanding; changing as person; for practical use; for community use; a process that requires

effort; and is continuous or ongoing. Samejima's Graded Response model was also used to select items with optimal measurement characteristics. In a second survey, the 50 item CoL-II was administered to a nationally representative sample of over 800 secondary school students. A further sample of 250 students also completed the CoL-II and a standardised achievement test. The paper will report the yet un-analysed results from this national profile of students' conceptions of learning and the relationship between conception of learning and achievement.

Dimensions of grades; Achievement and non-Achievement
Alli Klapp Lekholm, Department of Education, Göteborg University, *Sweden*

The main focus of this presentation is the result from a study investigating dimensions of grades by discerning achievement and non-achievement in grades. Achievement may reflect a subject-specific dimension of grades while non-achievement may reflect a common dimension of grades. The distinction between indirect and direct influences in grades is also made. Non-achievement may influence grades indirectly, by influencing student subject knowledge, which in turn influences grades. On the other hand, non-achievement may not influence student subject knowledge but still influence grades which may be interpreted as a direct influence in grades. The data analysed were taken from the ETF (Evaluation Through Follow-up) an ongoing longitudinal project in Sweden. The participants were 8874 ninth grade students, who left compulsory school in 2003. Two measurements were used, subject grades and national test scores in Swedish, English and mathematics from the end of compulsory school. Confirmatory factor analysis (CFA) was used, and a two-level model was executed in order to control for differences between schools. The result indicated that grades measure both achievement and non-achievement. The influence of achievement in grades seems to vary both concerning subject grades and national tests and between schools. Non-achievement seems to influence grades in all subjects and without any significant differences between schools which may support the hypothesis of a common factor in grades.

School and district effects in the literacy and mathematics achievement of Toronto District School Board students measured by provincial assessment: A preliminary application of hierarchical linear modeling in school effectiveness study
Robert S. Brown, Toronto District School Board, *Canada*
Erhan Sinay, Toronto District School Board, *Canada*

In Ontario, standardized assessment of student achievement has for the past nine years been the responsibility of EQAO (Education Quality and Accountability Office), an independent Crown corporation. There are four different assessments between Grade 3 and Grade 10. This cohort from the Toronto District School Board (1997-8 through 2005-6) is the first examination of a cohort participating in all four assessments, across eight years, going from the elementary into the secondary panel. The Toronto District School Board is considered one of the most diverse in the world. Preliminary analysis found that early (Grade 3) elementary Math performance is a general indicator of secondary (Grade 9) Math performance, but the prediction is by no means precise. Moreover, performance in early Reading appeared to be a slightly better predictor of secondary Math performance than early Math performance. This indicates that the difference between subject specific assessments may not be as great as generally perceived. Our more detailed study modeled the school and district effects in the Literacy and Math scores of the Education Quality and Accountability Testing program using Hierarchical Linear Modeling. Principal Component Analysis (PCA) of the test scores from the EQAO Reading and Writing conducted to derive a composite score as the outcome measure of overall student literacy achievement. Three-level

hierarchical models were fitted to estimate school and district effects in EQAO Literacy and Math scores, and to examine the school and district variance with variables assessing student characteristics. Three-level linear regression models were applied to the four data sets described above. The dependent variables were the literacy and Math achievement levels, reported on a scale that runs from 0 to 4. Characteristics examined included student mobility; school/district size; gender; special education, and school/district SES status.

N 2
31 August 2007 16:00 - 17:20
Room: 2.54 Novobátzky
Paper Session

Assesment of competence

Chair: **Gyöngyvér Molnár,** University of Szeged, *Hungary*

Do babies play make-believe? An examination of symbolic ability in infancy according to level of complexity of the action
Edna Orr, Bar Ilan University, *Israel*
Rivka Glaubman, Bar Ilan University, *Israel*

Performance of full action schemata served until the past decade as the exclusive measure for examining symbolic ability, and based on this measure it was concluded that symbolic ability appeared towards the middle of the child's second year. During the past decade, the improvement of research tools and their adaptation to the abilities of babies led to new insights regarding infants' cognitive and mental abilities. The present study examined symbolic ability in infancy according to the developing physiological abilities of babies aged 6-18 months, using a research instrument that was constructed for this purpose. In order to discern the physiological developmental components that are essential for play, the full action schema was divided into four sub-categories: simple actions on two levels (1 and 2) and complex actions on two levels (1 and 2). The examination of symbolic ability according to these levels led us to identify symbolic play from the age of six months, expressed mainly in simple level 1 actions, and towards the age of 18 months we detected simple level 2 actions. Complex actions at levels 1 and 2 are infrequent during this period. A statistically significant relationship was found between holding ability and the different levels of action. The theoretical and research implications of these findings are discussed, and it is recommended to follow up this study, adding further components to the research tool in order to identify intention to perform symbolic action and thus enhance the ability to identify symbolic abilities independently of motor performance.

Measuring citizenship competence of students from age 11 to 16
Femke Geijsel, Universiteit van Amsterdam, *Netherlands*
Geert ten Dam, Universiteit van Amsterdam, *Netherlands*
Guuske Ledoux, Universiteit van Amsterdam, *Netherlands*
Rene Reumerman, Universiteit van Amsterdam, *Netherlands*
Maartje van der Niet, Universiteit van Amsterdam, *Netherlands*

Citizenship education is compulsory in most Western countries. Measuring the efforts made by schools is important, for evaluative as well as comparative purposes. A reliable and valid instrument that focuses on the various components that are necessary for students to fulfill social tasks in a democratic society, is still lacking. It is the goal of a current nation wide research project in The Netherlands to build and test such an instrument that enables measuring (changes in) citizenship competences of large groups of students at the age of 11 to 16 years old and that enables to make judgements about the amount and development of citizenship competences in school classes or schools (not individual students). This paper proposal concentrates on the development of the instrument. The conceptual framework and the analyses of student survey data of two pilot studies will be presented. Results of confirmatory factor analyses will make clear whether the structure of the conceptual framework is represented in the data and whether items are biased by background characteristics of the students. Results of diverse groups of students (grouping based on age, gender, cultural background, school type, cognitive functioning) will then be presented and discussed.

Assessment of domain-specific epistemological beliefs and other aspects of the nature of science
Detlef Urhahne, University of Munich, *Germany*
Kerstin Kremer, University of Giessen, *Germany*
Jürgen Mayer, University of Giessen, *Germany*

The development of an adequate understanding of the nature of science is an important educational objective. Students should learn to understand the purpose of science, the epistemological assumptions about scientific knowledge and how scientific knowledge is accomplished. The purpose of our study was to develop a questionnaire measuring basic aspects of the nature of science in an economic way. Therefore, the research literature was analyzed on core dimensions and accompanying items and scales. In an investigation with 272 students seven core dimensions could be empirically confirmed including the source, certainty, development, justification and simplicity of scientific knowledge as well as the purpose of science and the creativity of scientists. Form the research results the partly insufficient understanding of the nature of science of the examined adolescents becomes apparent. The understanding is higher developed when students are in higher classes, have a higher domain-specific self-concept and show better learning achievement in the scientific subjects. In school science, teaching of the nature of science should be more in the focus.

Secondary qualitative analysis of the international PISA survey
Houssemand Claude, Universite du Luxembourg, *Luxembourg*
Martin Romain, Universite du Luxembourg, *Luxembourg*
Meyers Raymond, Universite du Luxembourg, *Luxembourg*

A secondary qualitative analysis of the international PISA 2000 survey will be presented. Some elements of PISA 2003 have also been used. The entire research has been carried out by the universities of Luxembourg and Moncton (Canada). Several analyses have been done to explain

which factors could explain the differences in results between the participating countries. The presentation will demonstrate that, despite efforts made by the OECD, the results obtained in answering items of the survey are not independent of cultural characteristics, which can be seen as potential biases of the measures. Three major results of our research study will be presented. The first result shows that the responses to differently structured items are not independent of different national teaching methods. The second result demonstrates that the construct validity of the measures, done in the framework of the a priori theoretical framework, is not satisfactory. Finally, the third result shows that social, familial, economic and personal characteristics are related to the cognitive performance of the students.

N 3
31 August 2007 16:00 - 17:20
Room: -1.63
Paper Session

Assessment methods

Chair: **Kari Smith,** University of Bergen, *Norway*

Students' criteria development as part of a formative assessment process
Kristin Holte Haug, Oslo University College, *Norway*

This paper presents results of a two year study, conducted among 450 undergraduate students (200 students in 2005 and 250 students in 2006) at the Faculty of Education (Early Childhood Education Programme), Oslo University College. The framework is socio cultural theory. The research question is: How do students approach an assignment where developing criteria of assessment is included, and what impact does students' work with criteria have on the students' learning potential? The students accomplished a four weeks examination entitled The Group as an Instrument for Learning, containing three parts: 1) Carrying out a written group discussion on criteria, aimed to agree on three student developed criteria 2) Writing an individual essay based on these three criteria 3) Writing a peer response on a peer's essay based on the certain criteria. Key findings: A majority of the students expressed that developing criteria is a manageable task. Most of them stated that they would prefer explicit criteria, and that they found their criteria helpful during their essay writing and peer response giving. A majority of the students demonstrated positive attitudes in the criteria process. They stated that developing criteria gave them a feeling of having control over their study in general, and over this specific exam. Further, they said that they learned from developing criteria and would likely do it again. Only a handful were negative and stated that the criteria development had little impact on their learning potential. These few stated that they had learned little from developing criteria, and they would rather not do it again. Based on these findings, it is reasonable to claim that the students' engagement in peer response and in the criteria development process enhanced the learning potential for a majority of the students. (289 words)

Peer reviewers' perspectives of their contribution to quality research in education and physical sciences

Yanping Lu, The University of Newcastle, *Australia*

Editorial peer review has existed for more than 200 years and achieved universal application. However, although much is determined empirically about editorial process, little is known about the way in which reviewers approach review for journals. There is also concern about the effectiveness of peer review in improving the quality of manuscripts. Similarly, while there are many assumptions about differences in various aspects of peer review between disciplines, little is based on empirical evidence. This paper addresses both issues, with particular attention to the much discussed 'differences' between peer review practice in Education and that in Physical Sciences. A mail questionnaire was conducted of senior academics (professors, associate professors, and some senior lecturers) in Education, Physics and Chemistry in the 37 universities in Australia who had served as journal reviewers. A total of 232 academics in roughly equal numbers by discipline were approached and 54 agreed to be involved. The survey gathered reviewers' demographic information, their impression of the effectiveness of peer review, their perceptions of their contribution as reviewers, etc. The data were analyzed qualitatively with some level of quantification to produce a profile of reviewers' perspectives. Selected findings include: editors and long-serving reviewers thought it was not up to peer review but the author to improve manuscript quality; reviewers' expression of the effectiveness of peer review was significantly correlated with their own experience with it; the most frequently cited reasons for declining to review were lack of expertise or time and conflict of interest; reviewers regarded reviewing more as part of professional obligation than a means to improve quality. There is a lack of compelling evidence to show that there was a difference in reviewers' perspectives of the role of peer review by discipline.

Unused potential – On some misconceptions about the value of Dynamic Assessment

Jens F. Beckmann, University of Sydney, School of Psychology, *Australia*

Dynamic Assessment, as an alternative approach to assessing intellectual capacities, focuses on examinees' ability to benefit from learning opportunities provided within the assessment process. The level of appreciation of the potential advantages of this assessment concept is not mirrored by the extent of its utilisation in practice. One reason for this constraint might be that, allegedly, the proponents of this approach have not yet succeeded in showing sufficient evidence for the validity of their assessment tools. The diversity within the field of dynamic assessment, characterised by a variety in the goals pursued, the methods employed, and philosophical perspectives on measurement makes it difficult to pass sentence regarding its validity. In the study presented, a set of dynamic tests has been used to exemplify a suggested strategy to evaluate dynamic tests in terms of validity. This strategy emphasised: (1) the explication of the construct dynamic tests are aiming at, and its relationship to other constructs; (2) the definition of construct representative external criteria; and (3) the demonstration of both predictive and incremental validity. Furthermore, it was conceptually argued and empirically demonstrated that (4) a variation of correlations between tests and external criteria across different (sub-)samples or studies can be explained as differential validity of dynamic tests, which is compatible with the conceptual understanding of the construct addressed in such learning tests and would be misinterpreted as an indicator of inconsistencies in validity-related findings in dynamic tests.

N 4
31 August 2007 16:00 - 17:20
Room: -1.64
Paper Session

New modes of assessment

Chair: **Tibor Vidákovich,** University of Szeged, *Hungary*

Development and use of a self-evaluation method for schools to determine the quality of their competency assessment programmes
Liesbeth Baartman, Utrecht University, *Netherlands*
Frans Prins, Utrecht University, *Netherlands*
Paul Kirschner, Utrecht University, *Netherlands*
Cees Van der Vleuten, Maastricht University, *Netherlands*

As assessment methods are changing, the way to determine their quality needs to be changed accordingly. Because one single assessment method is not enough to fulfil the new purpose of assessment for learning, we argue for the use Competency Assessment Programmes (CAPs), combinations of classical tests and new assessment methods which involve both formative and summative assessments. To assist schools in evaluating their CAPs, a self-evaluation procedure was developed, based on 12 qualities for CAPs developed in earlier studies. A self-evaluation was chosen as it stimulates reflection and is increasingly used as an alternative to external evaluation. The self-evaluation is carried out by a group of functionaries from the same school and comprises an individual self-evaluation and a group reflection interview. The school's CAP is rated on the 12 quality criteria and an example or evidence is asked for to substantiate these ratings. In this study, three functionaries from eight schools evaluated their CAP using the self-evaluation procedure. Results show that the reflection interview was very important as different perspectives on the CAP are assembled here into an overall picture of the CAP's quality. Regarding the ratings and substantiations, schools seem to be able to provide content-relevant substantiations for their ratings, but tend to use circular arguments.

Teacher-pupil-parent talks. An intentional perspective.
Gunnel Lindh, Uppsala University, Department of Teacher Educatio, *Sweden*
Agneta Lindh-Munther, Uppsala University, Department of Teacher Educatio, *Sweden*

This study concerns the teacher-pupil-parent talk, the so-called talk for development, a prescribed link between the home and the school in the Swedish compulsory school. The aim is to elucidate this "institutionalised personal talk." We are primarily interested in the individual's intentions in action. In an intentional conversational analysis the researcher on the basis of the individual speakers' concrete talk activities try to grasp the meaning of the talk for the individual by assigning him/her more or less conscious intentions – intentions in action, so-called projects. What individual projects are possible within the given frames? The data include 25 video recorded development talks made by 6 teachers in school year 6, and 245 questionnaires to pupils in year 6. The findings demonstrate the complexity of the talk for development. Even if the talks differ, there are many common patterns, as consensus, an informal tone, a lot of assessment of the pupils, etc. We interpret the global projects of the participants as a matter of presenting themselves as competent teachers, as good parents, and as well-mannered children/able pupils. These complimentary projects, in addition to the implicit purpose and procedures of the talk, strongly

limit the parents' and the pupil's possibilities to make themselves listened to. The teachers' subordinated projects appear to be, to show a confidential relationship to the pupil, to be able to inform, to comfort and to teach, but also projects that contradict the competent-teacher-project, as to reduce the bad news or to avoid the difficult issues. Our study points towards the necessity that at least all professional parties concerned are made conscious of the conditions of the talk for development on a structural as well as on an individual level, bearing in mind the assessment culture that the talk is part of.

The impact of a new assessment system in New Zealand: Views of teachers and students
Satomi Mizutani, University of Auckland, *New Zealand*

This paper describes research investigating both the nature of test impact on teaching and learning, resulting from a newly-introduced national assessment for senior students at New Zealand secondary schools, and the extent to which some intended positive impact could be identified. Unlike the previous norm-referenced national assessment which involved social comparison, the new national assessment is standards-based where students' performance is evaluated against pre-described criteria (Donnelly, 2000). Dweck (1992) stated that standards-based assessment could encourage mastery-goal orientation where students are concerned with mastering new skills and developing understanding rather than performance-goal orientation where students are concerned with doing better than others or proving intelligence. One of the Ministry of Education's aims was to motivate students of all abilities to strive for higher levels of achievement by providing clear standards as goals and emphasising self-comparison (Fancy, 2001). Perceptions of the new assessment were elicited through focus groups involving 7 teachers and 32 students of Japanese at secondary schools. A qualitative analysis of participants' responses revealed instances of both positive and negative test impact. While some positive intended impact was identified, the impact seen as negative by some students included 'a lack of competition'. This was, in fact, an intended impact as the new standards-based assessment was expected to encourage self-comparison rather than social comparison. Findings confirm claims made by some researchers (e.g. Alderson 2001, Barrows 2003) that test impact is a complex, multifaceted phenomenon mediated by teacher and student beliefs. Given the superiority of mastery-goal orientation for long-term effects (e.g. Ames, 1992), this study argues that there is a need for effort to shift from the old examination culture where students focused on surpassing their peers to the new one where they try to better their own previous achievement. Implications are drawn for standards-based assessment and for future test impact research.

The relation between learning style dimensions, appropriateness of workload and feedback, and evolutions in students' assessment preferences
Gert Vanthournout, University of Antwerp, *Belgium*
Christa Van Ginneken, University of Antwerp, *Belgium*
David Gijbels, University of Antwerp, *Belgium*

The present study wants to further investigate influencing factors in the evolution of students' assessment preferences. It takes into account dimensions of students' learning styles and hands-on experience with a learning- and assessment environment with appropriate workload and feedback possibilities when looking into the evolution of students' assessment preferences. Two research questions were formulated. First, how do students' assessment preferences change when they have hands-on experience with alternative learning and assessment procedures with appropriate levels of workload and feedback? Second, if students' assessment preferences change with hands-on experiences, do differences in the dimensions of students' learning styles influence the magnitude

and direction of this shift? The sample in this study consisted of 42 second year bachelor students enrolled in a gross veterinary anatomy course. Data were obtained from two sources: the Assessment Preferences Inventory (API) and the Inventory of Learning Styles (ILS). The study showed some evidence for the statement that appropriate feedback and workload influence the evolution of assessment preferences in a desired direction. Students prefer assessment methods with higher order thinking tasks more after being enrolled in a learning and assessment environment with a minimal workload and multiple feedback possibilities. This finding confirms assumptions made in other recent research. Moreover this study found some indications that dimensions in students' learning styles also influences assessment preferences. The impact of hands-on experience with a learning and assessment environment on assessment preferences is differentiated by students' approaches to learning, their regulation strategies and the way they perceive learning.

N 5
31 August 2007 16:00 - 17:20
Room: 7.14
Paper Session

Cultural diversity in schools

Chair: **Jesus Alonso-Tapia,** Universidad Autonoma de Madrid, *Spain*

"It's not funny": Young L2 novices' interactions with their Israeli native a nonnative peers
Shoshana Blum-Kulka, Hebrew University, *Israel*
Naomi Gorbat, Hebrew University, *Israel*

Can children help other children in learning a new language? How do L2 novices with limited linguistic resources interact with their native peers? We address these questions in the framework of a longitudinal ethnographic study of young immigrant children in Israel, exploring the ways in which communicative events are attempted or unfold through verbal and non-verbal means between Hebrew as L2 novices and their Hebrew speaking peers. Audio and videotaped interactions collected during the immigrant children's first few months in a Hebrew speaking environment were coded for identity of initiator, main modes of communication and outcome and then analyzed sequentially. Modes of initiation by all were found to vary individually and include gaze and smile, joking repetitions and touch and talk. Communicative events vary in ways in which different communicative goals (e.g., making friendly contact, requesting an object, play entry) are achieved (or not), how key (e.g., playful or serious) is being signaled and sustained, and how situational resources are being used intricately to compensate for limited linguistic resources. Both native and non-native children attempt interactions, yet such attempts do not necessarily lead to sustained mutual engagement; the social dynamics of the preschool are not conducive to such interactions as long as the novice L2 does not master the basics of the new language, but become peer talk is a powerful and varied resource once some mastery is gained. From an educational perspective, the important point about peer mediation for second language learning shown here that it's almost non existent for the L2 novice at the onset of learning but is provided in rich and varied ways later on. This timing raises the question whether the affordances of peer mediation provided to L2 novices through immersion practices should not be complemented by planned intervention to help shorten the 'silent' period.

"Sofia doesn't speak during team work." Using discourse analysis as a tool for the transformation of peer group interactions in an elementary multicultural science classroom.
Panagiotis Piliouras, University of Athens, *Greece*
Katerina Plakitsi, University of Ioannina, *Greece*
Panagiotis Kokkotas, University of Athens, *Greece*

This study deals with cultural diversity in the light of a wider on going action research program using different approaches and tools. It refers to a "developmental work research" program (Engestrßm, 1996) that concerns the gradual transformation of the nature and type of peer group interactions to more collaborative inquiry conditions in an elementary multicultural science classroom. The program had as an explicit objective to transform peer group interactions to more inquiry ones. A second objective was to study the role of cultural diversity in those collaborative inquiry settings. The under controlled hypothesis of the wider program is that collaborative inquiry in school science classrooms could function as a bridge between the different cultures in the classroom. In order to accomplish collaborative inquiry conditions in classroom we gave chance to teachers and students to analyze their own talk, using appropriate simplified discourse tools in the format of worksheets. We adopt the sociocultural driven position that the learning process can be viewed as appropriation-transformation through participation in gradually evolving discourses and practices (Rogoff, 2003). To accomplish this choice we should seek for a collaborative inquiry in nature (e.g. Wells, 1999) and oriented towards discourse (e.g. Hicks 1996) learning environment. We know that a literature review reveals that social interactions in collaborative activities do not always create effective learning processes (e.g. Hogan, 1999). But, we believe that science in the classroom could be a mean to overcome cultural diversity. School science classroom settings promote communication in many ways and give equal chances for the different cultures to contribute to the inquiry process. Last years, under the constructivist approach to learning and instruction, became clear to all science educators that children from all cultures have the same ideas on natural phenomena (Driver et al 1989) and share the same questions about them.

The effect of minority language courses on first and second language acquisition
Edina Caprez-Krompák, University of Zurich, *Switzerland*

This paper presents the longitudinal research project concerning the effect of minority language courses on first (L1) and second language (L2) task performance in primary schools in Switzerland (Caprez-Krompàk & Selimi, 2006). The study is based on the interdependence hypothesis of first and second language (Cummins, 1984), which says that cognitive and academic development of L1 has a positive affect on L2 for academic purposes and vice versa. However, a certain academic level of L1 must be reached to prevent facing cognitive and academic difficulties in L2 (threshold hypotheses, Cummins, 1984). The effectiveness of minority language courses is investigated by choosing a quasi-experimental design, including an experimental group (with minority language courses) und a control group (without minority language courses). This longitudinal study was aimed to answer the following questions: are there any differences in first (Albanian/Turkish) and second language (German) competences of minority children who participate in minority language classes (experimental group) in comparison to those who do not (control group)? How do different types of motivation influence the language performance? Which socio-demographic (socioeconomic status of family (SES) and gender) have an impact on language performance? Does self-assessment of language proficiency predict language performance in the first and the second language? The first data was collected in 2005 and the second in 2006. In total, the experimental group consisted of 83 Albanian and 54 Turkish minority pupils and the control group consisted of 46 Albanian and 12 Turkish school children.Firstly, we expect that attending a

minority language course at school has a positive effect on the language competences in the first language. Secondly, a high correlation between motivation/SES and language achievement is assumed.

English in primary school: Assessing speaking skills of young learners
Andrea Haenni Hoti, University of Teacher Education, *Switzerland*
Sybille Heinzmann, University of Teacher Education, *Switzerland*

This contribution presents the research project concerning English in primary schools in Central Switzerland (Haenni Hoti, 2006a; 2006b). The study investigates the model (L2 English, 3rd grade / L3 French, 5th grade) which was introduced in several cantons at the beginning of the 2005/2006 school year. The effectiveness of English instruction at primary schools is investigated by means of a quasi-experimental design, including a randomised test and control group (pupils in 3rd grade of primary school with and without English; N=1008). The first data for this three-year longitudinal study were collected in April/Mai 2006. Quantitative instruments (written and oral achievement tests for pupils) were used in order to assess children's listening, reading and speaking skills. This contribution aims at addressing the following questions: which English speaking skills are acquired in the 3rd grade of primary school? Which socio-demographic (literacy of family, gender) and learner-related factors (motivation, learning strategies) have an impact on English speaking skills of young learners? Additionally, the achievement of bi- and multilingual children with a migration background is compared to that of monolingual children in order to find out if the former can benefit from their previous experiences of second language learning. As an illustration, video extracts from the English speaking test will be shown to the audience. The insights gained from this study will be compared to those of other research projects concerned with early foreign language learning carried out in Canada (White & Turner, 2005), Germany (Werlen et al, 2001-2005) and Switzerland (Býeler et al, 2001; Schaer & Bader, 2005) and discussed with reference to theoretical approaches to second/third language acquisition.

N 6
31 August 2007 16:00 - 17:20
Room: 0.87 Marx
Paper Session

Mathematics education

Chair: **Lieven Verschaffel,** Katholieke Universiteit Leuven, *Belgium*

Efficiency and flexibility of adults' strategies on multi-digit sums
Joke Torbeyns, K.U.Leuven, *Belgium*
Lieven Verschaffel, K.U.Leuven, *Belgium*
Pol Ghesquiere, K.U.Leuven, *Belgium*

This study aimed at analyzing the adaptive nature of adults' strategy choices in the domain of multi-digit arithmetic, using the choice/no-choice method. In line with recent theoretical models on adaptive strategy choices (e.g., Cary & Reder, 2003; Siegler, 1996), strategy adaptiveness was defined on the basis of both item and strategy performance characteristics. Twenty-five university students were offered three-digit subtractions in one choice condition, wherein they could use their

preferential strategy on each item, and two no-choice conditions, wherein they had to solve all items with either direct subtraction or indirect addition strategies. Results indicate that adults apply both direct subtraction and indirect addition strategies on three-digit subtractions, and fit their strategy choices flexibly to both item and strategy performance characteristics. These results provide empirical evidence for the validity of the multiple-procedures view, and of recent theoretical models on adaptive strategy choices, in the domain of multi-digit arithmetic. Moreover, indirect addition strategies were most efficient on multi-digit subtractions. This result sheds new light on current instructional practices, focusing on the mastery of direct subtraction strategies on multi-digit subtractions.

Mistake-handling activities in the mathematics classroom: Effects of an in-service teacher training on students' performance in geometry
Aiso Heinze, University of Munich, *Germany*
Kristina Reiss, University of Munich, *Germany*

For many students' and teachers' mistakes are associated with negative feelings. Despite the fact that „mistakes are the best teachers", according to a well-known everyday proverb, teachers and student hardly take advantage of mistakes in the learning processes (Heinze, 2005). Thus we investigated the effects of teacher training on the role of mistakes in the learning of mathematics. We used a quasi-experimental design with 619 students from 29 classrooms in grades 7/8. Teachers of an experimental group received a combined training to learn from mistakes and to teach reasoning and proof, whereas the teachers of the control group only had training in reasoning and proof. Their students took part in a pre-test with reasoning and proof tasks, and in a corresponding post-test that was conducted two months after teacher training. Moreover, the students were asked to evaluate how the teachers handled their mistakes. Our findings show that the teacher training was successful under two aspects: On the one hand, the teacher of the experimental group changed their behavior as far as the handling of mistakes was concerned. This was done in a manner that was recognized by their students. The difference between experimental and control group indicated moderate effects. On the other hand, compared to the students in the control group the students in the experimental group performed significantly better in geometry post-test. In particular, their improvement was based on a better performance on proof items asking for high competency.

The role played by the classroom in determining curriculum enactment
Tammy Eisenmann, weizmann Institute of Science, *Israel*
Ruhama Even, weizmann Institute of Science, *Israel*

The aim of this study is to investigate the role played by the classroom in determining curriculum enactment. The study addresses this issue by comparing and contrasting the types of algebraic activities (Kieran, 2004) enacted in two classes taught by the same teacher. The research comprises two case studies. Each case includes one teacher who teaches two 7th grade classes; each from a school with a different socio-cultural background. The same textbook is used in all four classes. Holding constant both the textbook and the teacher aim to provide information on the role played by the classroom in determining the enacted curriculum. Data sources include observations of the same learning unit in each class and interviews with the teachers and the students. Data are analyzed both quantitatively and qualitatively. Using Chi-square test, we compared the distributions of algebraic activity types in the textbook and in each enacted curriculum. Common methods of qualitative research were used to suggest explanations for the differences found. The findings of this study show that in both cases there was more emphasis on

global/meta-level activities in one school compared with the other school. In addition, in one of the cases there was also more emphasis on transformational activities in one of the schools. The study suggests explanations to these differences that are related to the different situations in which each of the teachers worked, highlighting the role of the classroom and the school in curriculum enactment.

Assessment of flexibility and fluency of strategy use in written arithmetic at the upper grades of primary school
Cornelis M. van Putten, Leiden University, Department of Psychology, *Netherlands*
Marc L. Molendijk, Leiden University, Department of Psychology, *Netherlands*
Meindert Beishuizen, Leiden University, Department of Education, *Netherlands*

This paper describes the development of a valid and reliable test to assess the amount of student's flexible and fluent strategy use in written arithmetic at the upper grades of primary school. Flexibility was defined as the ability to choose a strategy that best fits a problem. Fluency was defined as the ability to solve a problem in an efficient way as reflected in the number of solution steps and the total solution time. A test of 18 items covering four domains - addition & subtraction, division, multiplication, and numerical estimation - was constructed and administered to 283 students from 12 primary schools. Students were asked to write down their workings and their answer for each item. The results show that both flexible and fluent strategy use could be assessed in an internally valid and a reliable way with this instrument. Scores for flexibility and fluency were very strongly correlated, even after correction for general mathematical competence, so the question arises whether these two concepts should be discriminated. Within-subject effects were found for mathematical domain and for item format (context versus number problem). Between-subject differences were found for general mathematical competence and for gender. However these effects were rather different for flexibility and fluency, which is an argument for keeping the discrimination between these concepts.

N 7
31 August 2007 16:00 - 17:20
Room: 3.67 Békésy
Paper Session

Educational effectiveness

Chair: **Hans Gruber,** Universität Regensburg, *Germany*

Teaching and learning environments – (How) do they affect language learning?
Nina A. Jude, German Institute for Int. Educational Research, *Germany*
Johannes Hartig, German Institute for Int. Educational Research, *Germany*
Klieme Eckhard, German Institute for Int. Educational Research, *Germany*

Language teaching and learning in school is not only influenced by various individual factors, but also by different characteristics of the teaching and learning environments. Theoretical models and latest empirical studies emphasize the important role of learning opportunities and classroom structure and name various teaching methods to be fundamental for learning. One aim of educational research is to identify those classroom characteristics that are positively related with

student achievement at classroom level. Given the large number of potentially relevant variables and the complexity of their effects on learning, the use of linear models is limited for these concerns. Therefore, finite mixture distribution models – also know as latent profile analysis – can be used to define different profiles of learning environment. In these "model based cluster analyses", relations between classroom characteristics are modelled by an underlying categorical latent variable. Each category of the latent variable corresponds to a latent profile of indicators for teaching and learning, thus displaying latent groups with specific learning environments. This contribution presents data from a German large-scale-study of language competence in the 9th grade. Language competence in German was assessed both at the beginning and end of the school year, allowing estimating growth in language competencies for each student. Teachers' and students' view on the learning environment was assessed by questionnaires. The aim was to identify classroom characteristics that are positively related with learning outcome at classroom level using latent profile analysis. Different criteria of classroom instruction related to effective language learning were found, concerning teaching methods in general as well as those related to language teaching in particular. Both teachers' and students' perceptions of learning environments can be seen as relevant indicators for the learning outcomes. Implications of these findings for language teaching and further research in this area will be discussed.

Teaching the control of variables strategy (CVS): A closer look at student performance
Mari Strand Cary, Carnegie Mellon University, *USA*
David Klahr, Carnegie Mellon University, *USA*

In the present study, we explored the extent to which type of instruction affects how students learn to design unconfounded experiments through the Control of Variables Strategy (CVS). Prior results found that students who received explicit instruction were more likely to master CVS than students who explored the materials on their own. However, once students attained mastery, students in both conditions performed equally well on transfer tasks, suggesting learning path independence. In the current study, we explored how the definition of mastery and the type of assessment affect these results. Instruction focused on CVS, the procedure and concepts underlying the design and evaluation of simple unconfounded experiments. Despite this skill's foundational role in formal science, previous studies have suggested that young children's grasp of it is tenuous at best. We investigated the effects of two instructional approaches (Explicit Instruction and Exploration) on children's ability to learn basic experimental design and to transfer that knowledge to other contexts. We measure academically-realistic short-term (i.e., immediate and one week) and long-term (i.e., three month) outcomes through a hands-on experimental design task, a near-transfer written test, and a far-transfer poster evaluation task. Defining mastery in different ways revealed different instructional effects. Regardless of definition, significantly more children in the Explicit Instruction condition exhibited the skill in the same session in which it was taught. By contrast, three months later, equal numbers of children in the two conditions performed well on the task if we use complete mastery, however, significantly more children in the explicit instruction condition performed well if we use partial mastery. No group differences were found for near- or far-transfer tasks. We found educationally-informative support for path-independence.

A model for effective schools in Romania
Catalina Lomos, RUG, Groningen, *Netherlands*

Effective schools is an important outcome of the educational process. There are numerous variables and characteristics from different educational levels that proved important in assuring high students' achievement and schools' success. In the last ten years, in the educational

effectiveness research (EER), the significant variables related to school success were organized in models that apply to similar social and educational contexts. The schools' effectiveness models are complex constructs that combine significant variables from different levels: students, teachers and school level. The aim of this article is to elaborate theoretically a model for effective schools and test its viability in the Romanian educational context. The model for effective schools contains variables on three levels: students, teachers and school, and the analysis is a multi-level perspective. The goal of the investigation is to test which variables from the designed model have a significant effect on students' academic achievement, as indicator for school success. The data is represented by the datasets of TIMSS 2003, Romania, for the eight grade students and their achievement in mathematic tests. The sample is composed of 4096 students, 148 teachers and 146 schools. The expected outcomes of the research project are the validation of a model for effective school in Romania, the identification of the most important variables for students' success and of the possible interaction effects between variables from different educational levels, present in the design. Due to the qualitative sampling in TIMSS assessment, the results obtained can be generalized on the level of secondary schools in Romania and increase the utility of the effectiveness model tested. Identifying the most important variables for school success can have positive effects on sustaining the process of school improvement.

Less selective motor memory consolidation in childhood: reduced susceptibility to interference
Esther Adi-Japha, Bar-Ilan University, *Israel*
Shoshi Dorfberger, University of Haifa, *Israel*
Avi Karni, University of Haifa, *Israel*

Are children superior to adults in consolidating procedural memory? Here, using a motor sequence learning task, we show that a) the rate of learning during a training session, b) the gains accrued, without additional practice, within a 24 hours post-training interval (delayed consolidation gains), and c) the long-term retention of these gains, were as effective in 9, 12 and 17-year-olds and comparable to those reported for adults. However, the establishment of a memory trace for the trained sequence of movements was found to be highly susceptible to interference by a subsequent motor learning experience (practicing a reversed movement sequence) in the 17-year-olds but not in the 9 and 12-year-olds. Thus, only the 17-year-olds showed the previously described adult pattern of interference. Altogether, our results indicate the existence of an effective consolidation phase in motor learning both before and after puberty, with no childhood advantage in the learning or retention of a motor skill. However, the ability to co-consolidate different, successive, motor experiences, demonstrated in both the 9 and 12-year-olds, diminishes after puberty, suggesting that a more selective memory consolidation process takes over from the childhood one. Only the adult consolidation process is gated by a recency effect and in situations of multiple, clashing, experiences occurring within a short time-interval, may less effectively establish in memory preceding experiences if superseded by newer ones.

N 8
31 August 2007 16:00 - 17:20
Room: Konferencia
Paper Session

Metacognition

Chair: **David Whitebread,** University of Cambridge, *United Kingdom*

Teachers' judgments of students' computational strategies and skill: How accurate, how well calibrated, and how important are they in determining instructional effectiveness?
Anthony Gabriele, University of Northern Iowa, *USA*
Kim Knesting, University of Northern Iowa, *USA*
Shawna Feldman, University of Northern Iowa, *USA*

In this study we examined: (1) the accuracy of teachers' judgments of students' computational proficiency, (2) whether the confidence teachers have in their judgments is well calibrated with the accuracy of their judgments, and (3) whether the accuracy and calibration of teacher judgments is associated with classroom learning. Nineteen 1st and 2nd grade teachers were asked to make predictions about the current computational performance of a sample of randomly selected students from their classrooms. Data on the computational performance of each teacher's entire class was concurrently collected. Results revealed that on average, teachers' judgments were accurate and well calibrated. However, only calibration of teachers' judgments predicted student learning. The theoretical significance and practical implications of this work will be discussed.

Self-regulation when answering questions from a text
Eduardo Vidal-Abarca, University of Valencia, *Spain*
Amelia Mana, University of Valencia, *Spain*
Laura Gil, University of Valencia, *Spain*
Catalina Dominguez, University of Valencia, *Spain*

This paper examines the differences between good and poor comprehenders' metacognitive abilities when answering questions from a text, and tests the impact on students' self-regulation of introducing a delay between reading the text and answering the questions. Two experiments were conducted to examine these two issues. In the first experiment junior high school good and poor comprehenders read two PISA-2000 expository texts and answered eight questions from each text. On-line measures of monitoring comprehension of questions using an error-detection paradigm and of self-regulation of the question-answering processes were obtained. Results showed that good comprehenders outperformed poor comprehenders on the total score of the questions and on the two metacognitive measures. In a second experiment a new condition was introduced. Approximately half the students read, and then answered questions on, text 1. They then did the same with text 2 (as in experiment 1). The remaining students read texts 1 and 2, and then answered questions from the texts in the same order, so that a delay was introduced between reading the text and answering the corresponding questions. Though the experiment is still in progress, preliminary data from a large group of students replicates results from experiment 1 regarding the differences between good and poor comprehenders, and indicates that the delay between reading the text and answering the questions has an impact on self-regulation of the question-answering process, but not on monitoring the comprehension of the questions. Theoretical and practical applications of these results will be discussed.

Effects of metacognitive strategy training and accuracy of monitoring on learning outcome
Christoph Mengelkamp, University of Koblenz-Landau, *Germany*
Maria Bannert, Chemnitz University of Technology, *Germany*

The study combines research on accuracy of monitoring with educational research on training of learning strategies, in particular training of metacognitive strategies. We make the assumption that amount of monitoring and accuracy of monitoring are different aspects of metacognition, the first concerning the quantity of strategy use and the latter concerning its quality. It is assumed that training facilitates the use of metacognitive strategies, but that this facilitation is not effective with regard to learning outcome unless accuracy of monitoring is high. Further, this facilitation may be counterproductive when accuracy of monitoring is low because learners waste time and effort acquiring misleading information about their success in learning. Thus, the key hypothesis of the study is that accuracy of monitoring and amount of monitoring interact in their effects on learning outcome. In order to test this hypothesis, a 2 x 2 – between-group-design (N = 100) is used with training of metacognitive strategies and keyword-taking as independent and learning outcome as dependent variables. According to a study by Thiede, Anderson, and Therriault (2003), keyword-taking affects the accuracy of monitoring but not the learning outcome immediately after the keywords have been taken. Further, training of metacognitive strategies should foster the frequency of monitoring but less so its accuracy. As measures of treatment fidelity, accuracy immediately after the treatment and after learning is measured, and retrospective questionnaire data about the use of monitoring strategies are collected. The results are discussed with respect to models of self-regulated learning, the validity of different measures of metacognition, and training.

Evaluation of strategy acquisition and transfer in metacognitive training for children with learning difficulties
Melanie Bosson , University of Geneva, *Switzerland*
Christine Hessels, University of Geneva, *Switzerland*
Jean-Louis Berger , University of Geneva, *Switzerland*
Nadine Kipfer , University of Geneva, *Switzerland*
Fredi Büchel, University of Geneva, *Switzerland*
Marco Hessels, University of Geneva, *Switzerland*

This presentation is aimed at the analysis of strategies acquisition and transfer in a metacognitive intervention comprising decontextualised tasks (non school tasks) and contextualised tasks (mathematical problems and reading comprehension). Analyses are based on a category system that is applied within a computer program that allows real time coding of video observations. Qualitative and quantitative date from 16 children with learning difficulties will be discussed. We will focus on the acquisition of metacognitive and cognitive strategies in the decontextualised tasks and the transfer of these strategies to mathematical problems.

N 9
31 August 2007 16:00 - 17:20
Room: 4.95
Paper Session

Attitudes

Chair: **Márta Fülöp,** Psychological Institute of MTA, *Hungary*

Students' attitude towards school subjects and its correlations to other school relevant factors Results from a Hungarian large-scale longitudinal survey
Rita Kelemen, University of Szeged, *Hungary*
Mária B. Németh, University of Szeged, *Hungary*
Csaba Csíkos, University of Szeged, *Hungary*
Benő Csapó, University of Szeged, *Hungary*

This study plans to monitor the changes in Hungarian students' attitudes towards different school subject using data form a nationwide representative longitudinal survey. The research aims at presenting general nationwide tendencies as well as correlations between attitudes and achievement factors on classroom and individual level. In accordance with results from previous (cross-sectional) studies, it is hypothesized that (1) there is a negative change in attitudes during the school years, (2) there are relevant differences among students' groups in the strength of correlations between attitudes and achievement, and (3) correlation between attitude and achievement varies significantly across school subjects. The samples of the survey included 270 classes of 13 schools in two age groups: 13- (N=3530) and 17-year-old (2418) students. The sample was representative for the corresponding populations with respect to territorial coverage, gender and socio-cultural background. The longitudinal study has one measurement point in each year. The first year was 2004, so by the time of the conference the first three years' data will be available. A questionnaire was administered to the students containing items on attitudes and social-economic background variables. The attitude towards school subjects was measured on a 5-point scale. It has been revealed that there is a general negative tendency in attitudes during the school years. There are subjects towards which negative attitudes were observable in each population of students. It has been revealed on classroom-level that the more positive attitude is measured towards a subject the stronger correlation is observable between achievement and attitude in that subject. Our longitudinal study enables investigating causal relationships between an individual's attitude change and the individual's school achievement.

The influence of school attitudes, achievement, and educational intentions on school completion and university participation
Seik Toon Khoo, Australian Council for Educational Research, *Australia*
John Ainley, Australian Council for Educational Research, *Australia*

An important review of school engagement called for'longitudinal research that explores the mediating processes between behavioural and emotional disengagement and dropping out' (Fredericks et al, 2004). This paper uses structural equation modelling of longitudinal data from 11,685 students from 300 schools followed over five years to investigate relationships between student background, school attitudes, achievement in literacy and numeracy, educational intentions and subsequent participation in post-compulsory education. It examines the direct and mediated influences of school attitudes and achievement on school completion and university participation.

The results indicate that, after student background and proficiency in literacy and numeracy are taken into account, attitudes to school have a substantial influence on students' intentions to complete high school and those intentions effect their actual completion. The effects of attitudes to school on students' intentions towards and participation in university education follow a similar pattern. Moreover, most student background characteristics such as socioeconomic status influence participation through the mediating influence of educational intentions rather than directly. The paper concludes that attitudes to school influence subsequent participation through the mediating influence of intentions. Achievement in reading and mathematics influence participation directly and through the mediating influence of intentions. Attitudes to school are relatively independent of both proficiency in literacy and numeracy and student background. Therefore the nurturing of favourable attitudes to school provides an important avenue for influencing participation through school and to education beyond school.

Teacher expectations, student achievement and perceptions of student attitudes
Christine Rubie-Davies, University of Auckland, *New Zealand*

Some teachers have been identified as having high or low expectations for all students in their classrooms. High expectation teachers have been shown to have differing pedagogical practices and beliefs to those of low expectation teachers. Students with high expectation teachers make much greater reading progress than do their counterparts and their self-perceptions move in the direction of their teachers' expectations. The current study explored how high and low expectation teachers view their students' attitudes to schooling. Results were analysed in relation to teachers' expectations and students' achievement. For high expectation teachers the relationships between their expectations, student achievement and their perceptions of student attitudes were all significant and positive. The pattern for low expectation teachers was quite different. The findings are discussed in terms of the theoretical significance of the research and implications for educational practitioners.

"On the yellow brick road" - making the educational knowledge taught in teacher-training relevant knowledge
Sarit Segal, Levinsky College of Education, *Israel*
Irit Nassie, Levinsky College of Education, *Israel*
Naomi Perchik, Levinsky College of Education, *Israel*
Galit Carmeli, Levinsky College of Education, *Israel*

The study investigated the impact of an innovative first-year teacher-training college curriculum on the students' perceptions of teaching and learning. The essence of the program is self-study in peer groups mentored and supervised by senior college staff. Learning is organized around questions, with the aim being not to find the one correct answer but to raise and explore fertile questions which are not clear-cut but evoke doubt and where many and even contradictory answers are possible. In other words the program design is oriented on process not solutions. It compels trainee teachers to intellectually and methodologically confront the problems set by the content of education's core disciplines, these disciplines being taught as general introductory first-year courses, in an interdisciplinary framework. Data were gathered by means of a structured statement questionnaire devised specially for this evaluation and completed by students at the start and end of the program. Statistically significant differences were found between the two measurement times on all indicators relating to perceptions of teaching-learning. After the program fewer students held to the traditional conception of teaching (as 'delivery') and more to the notion of learning as self-created knowledge.

N 10
31 August 2007 16:00 - 17:20
Room: Harmónia
Paper Session

Motivation

Chair: **Maria Cardelle-Elawar,** Arizona State University - West Campus, *USA*

Goal orientation patterns, self-regulated learning, and academic achievement in high-school students: The role of perceived parent goal orientation
Svjetlana Kolic-Vehovec, University of Rijeka, *Croatia*
Barbara Roncevic, University of Rijeka, *Croatia*
Igor Bajsanski, University of Rijeka, *Croatia*

The aim of the present study was to identify patterns of goal orientations in high-school students and to examine the relations between perception of parents' goal orientation and motivational and cognitive components of self-regulated learning in each group with specific goal orientation pattern, as well as the relevance of these components as predictors of academic achievement. High-school students (N = 358) responded to a self-report questionnaire, which included Personal achievement goal orientation scales, and Perceptions of parent goal scales from PALS (Midgley et al., 2000) and five subscales from Components of Self-Regulated Learning Inventory (Niemivirta, 1998): Students' goal orientation, Perceived control, Perceived ability, Value of studying, Deep processing strategies, Surface processing strategies and Self-handicapping. GPA was used as indicator of academic achievement. Cluster analysis of the scores of students' goal orientation revealed three clusters with specific goal orientation pattern: (1) mastery-oriented group (above average mastery, below average performance and work-avoidance); (2) multiple goals group (above average in all three orientations); (3) work-avoidance group (above average work-avoidance, below average mastery and performance orientation). Correlation analysis showed that perceived parents' orientation on mastery and performance were independent in mastery-oriented group of students, while parents' orientations were moderately positively related in other two groups. Perceived parents orientation on mastery showed positive correlations with all components of self-regulated learning in mastery-oriented group. Motivational components of self-regulated learning were positively related to deep processing strategies in mastery oriented group and multiple goals group. Regression analyses showed that perceived ability significantly predicted academic achievement in students oriented on mastery, while lower perceived parents' orientation on performance significantly predicted academic achievement in multiple goals and work-avoidance group. Lower use of self-handicapping strategies significantly predicted academic achievement in all three goal orientation groups.

Social comparisons: gains or losses?
Jens Möller, University of Kiel, *Germany*
Britta Pohlmann, University of Kiel, *Germany*

Students use social comparisons to evaluate their performance, comparing their own achievement in school subjects with that of other students. Downward comparisons triggered by good performances tend to enhance the academic self-concept, whereas upward comparisons triggered by poor performances tend to lower the academic self-concept. Two field studies and one experimental study were conducted to investigate the psychological effects of achievement on

students' self-evaluations. The main purpose was to analyze the net effects of social comparisons, i.e., whether gains following above-average achievements or losses following below-average achievements are more pronounced. In Study 1 (N = 382), the gains of above-average students were larger than the losses of below-average students (relative to average students). In Study 2 (N = 1349), the same pattern emerged with reading test scores as well as grades as achievement indicators. In an experimental replication, Study 3 (N = 81) found larger gains than losses in both self-perceived competence and satisfaction with a test result. Findings are discussed against the background of the theory of social comparisons.

Motivational and linguistic pathways to reading comprehension at grade 2
Janne Lepola, Univ. of Turku, *Finland*
Kaisa Aunola, Univ. of Jyväskylä, *Finland*
Pekka Niemi, Univ. of Turku, *Finland*
Marja-Kristiina Lerkkanen, Univ. of Jyväskylä, *Finland*

The aim of this 3-year longitudinal study was to examine the developmental relationship of linguistic and motivational factors in predicting reading comprehension at grade 2. We will analyse by means of Latent Growth curve Modelling (LGM) the extent to which reading comprehension at grade 2 is predicted by the level of oral comprehension skills and motivation in kindergarten, on the one hand, and by their changes from kindergarten to grade 1, on the other, after controlling for the impact of word decoding at grade 1. The participants were 139 Finnish-speaking children. Kindergarten and grade 1 teachers rated children's motivational tendencies, that is, task orientation and social dependence at three time points. Analyses showed that the kindergarten levels of listening comprehension and comprehension of instructions had both significant contributions to reading comprehension over and above the effect of word decoding. Moreover, the growth of oral language comprehension skills from kindergarten to grade 1 positively predicted later level of reading comprehension. Finally, changes in task orientation and social dependence orientation from kindergarten to grade 1 were negatively related to later reading comprehension, suggesting that children's motivational responses to the beginning reading instruction have far-reaching impact on reading achievement.

The development of mastery motivation at age 10-16
Krisztián Józsa, University of Szeged, *Hungary*

The development of mastery motivation is probably one of the most intensively investigated fields of mastery motivation research. Mastery motives force us to train and master a certain skill or ability. Under adequate conditions, they operate as long as the challenge persists and as long as acquisition is not complete, i.e. until mastery has been reached. Although the literature demonstrates the necessity of research on school age groups, as well as empirical studies of the development of mastery motives, only a few such studies have been published. The aim of the present study is the investigation of mastery motivation among 10-16-year-old children (grade 4, 6, 8 and 10) in a Hungarian context. Hungarian versions of the Dimensions of Mastery Questionnaires were developed. The self-reported version of the DMQ and both mothers' and teachers' ratings were administered. The cross-sectional study involved more than 6000 students. Teacher ratings of 3200 students' motives and parent ratings of 3700 students' motives were collected. The questionnaires have good psychometric properties. The interrater correlations were moderate. It appears from the data that there is a rather pronounced difference of judgement on children's motivation among the children themselves, their teachers and their parents. All three raters (teacher, parent and child) indicated the reduction of mastery motives during the examined

period. A radical decrease in the number of highly motivated students might explain this phenomenon. Decrease is the greatest in the case of the gross motor motive (14%p) whereas it is the smallest in the case of mastery pleasure (4%p). The decrease of the cognitive motive lies at 8%p, that of social with adults at 9%p and that of social with children at 10%p. It is an important research task for further studies to explore the reasons behind, and ways of reversing, this unfavourable tendency.

N 11
31 August 2007 16:00 - 17:20
Room: 0.89 Jedlik
Paper Session

Social aspects of learning

Chair: **Richard Walker,** University of Sydney, *Australia*

Mapping academic networks in an inter-university collaboration
Raquel Morales, Cambridge University, *United Kingdom*
Patrick Carmichael, Cambridge University, *United Kingdom*

We describe network mapping exercises designed to explore the character, boundaries and evolution of academic networks within the 'Reusable Learning Objects' Centre for Excellence in Teaching and Learning (RLO-CETL), a five-year project (2005-2010) involving staff from three UK universities. One of the goals of the RLO-CETL is to provide sustainable and reproducible processes that will allow sector-wide collaboration, so as part of the internal formative evaluation of the RLO-CETL, we are concerned to analyse its nature, and how this develops in relation to individual and institutional contexts, priorities and structures. The first task is an open-ended 'mapping' task accompanied by an interview allowed 28 participants (who included lecturers, tutors, students, multimedia developers, administrators, evaluators and managers) represent graphically and talk about their conceptions and perceptions of the networks of people with whom they communicated. This task also acted as a 'name generator' for a second task in which the same group of participants were surveyed using a novel questionnaire in which they were asked to provide more structured information about the nature and frequency of their communications and those members of the network to whom they went for advice or to whom they gave advice. This revealed the role of different modes of communication in maintaining 'strong' links within institutional teams and the 'weak' links across the RLO-CETL as a whole; the role of special events, workshops and conferences is also discussed. A second area of interest is 'advice size' within networks, where results pointed up differences in the ways in which individuals interprete their roles and the nature of interactions within the network. We conclude with some reflections on how distributed organisations such as the RLO-CETL can best support both intensive collaboration and sustainable networked activity.

Developmental level of social skills at the age of 7, 9 and 11
Anikó Zsolnai, University of Szeged, Department of Education, *Hungary*
László Kasik, University of Szeged, Department of Education, *Hungary*

The aim of our cross-sectional research was to describe the developmental level of social skills necessary for succeeding in school context. Our objective was to gather information about the development of social skills in early school-age and in early adolescence. The sample of our empirical study consisted of 1398 students, 7-, 9- and 11-year olds. Based on Stephens's list of social skills, a 54-item Likert-type questionnaire was developed (SSQ). The self reported version of the SSQ and both parents' and teachers' ratings were administrated. The child and the adult versions share the same structure and scale items. The reliability of the test proved to be remarkably good for both age groups and for all three evaluators. The results show no spontaneous development in the field of social skills between the ages 7-11. There was moderate correlation between the three evaluators' judgement concerning the developmental level of children's social skills. All three respondent groups indicated that girls' social skills were slightly more developed than those of boys. Teachers, however, perceived this difference to be twice as large as the other two raters.

"Teaching to philosophize in a socio-cultural approach: an "Activity" model."
Marina Santi, University of Padova, *Italy*
Rossella Giolo, University of Padova, *Italy*

In Italy Philosophy is taught in secondary school mostly through an historical approach. Only recently a debate on different approaches to teach philosophy is developing, considering the discipline as practical and dialogical activity to be fostered in the classroom. But what could mean "doing philosophy" in the classroom? This research tries to answer this question by elaborating a model for teaching philosophy, or better, for teaching to philosophize in a socio-cultural perspective. An "activity" model is proposed following the theory developed by Vygotskij, Leont'ev and other contemporary scholars. Firstly, the model individualizes seven fundamental dimensions which characterise didactical practice conceived as activity in a vygotskian sense; secondly, the seven dimensions are declined with respect to philosophy, view as meaningful and mediated activity, that is as reflective and dialogical socio-cultural practice; thirdly, the recognized dimensions are applied to philosophizing in the classroom as instructional context transformed by specific actions and operations, into "community of learning", "of discourse", "of practice, and "of research". The declinations of these dimensions of activity respect to philosophical practice and to the teaching of this practice in the classroom are analysed and discussed. Moreover, a set of didactic actions and operations are offered to operationalize the model for the specificity of teaching and learning philosophy. In particular, classroom discussion is view and proposed as a cross-activity, which operationalizes all the dimensions individualized in the model. The model is applied in a course of didactic of philosophy for in service secondary school teachers. The 45 teachers tested this model to promote an alternative approach to teach philosophy in this school grade, emphasizing philosophical activity in their classroom, in particular proposing the setting of discussion as privileged context in which the seven dimension of the model could be individualized. Results of this exploratory study are discussed in the paper.

The role of socialization and out of school experiences in primary school boys' and girls' motivation to learn about math and computers
Anna Chronaki, University of Thessaly, *Greece*
Ioanna Vekiri, University of Thessaly, *Greece*

In this study we used self-report questionnaires to examine possible relations between students' motivational beliefs, gender, socioeconomic status (SES), gender-stereotyped beliefs, perceived parental and peer support, and math and computer experiences outside school for 340 Greek

primary students. Data analysis showed significant gender differences in students' computer and math self-efficacy as well as in their gender-stereotyped beliefs about computers and math. Regression analysis showed that perceived parental and, to a lesser extend, peer support were the factors more strongly associated with students' self-efficacy for both math and computers. Also, gender-stereotyped beliefs were strongly related to math self-efficacy (positively for boys and negatively for girls), and the relationship was stronger for boys. Our findings highlight the role of socialization, gender stereotypes, and out-of-school experiences in the development of students' motivation to learn math and computers.

N 12
31 August 2007 16:00 - 17:20
Room: 0.81 Ortvay
Paper Session

Pre-service and novice teachers

Chair: **Sylvia Rojas,** National Autonomous University of Mexico, *Mexico*

Planning and teaching thought processes of teachers and student teachers
Philippe Wanlin, University of Luxembourg, *Luxembourg*

This paper analyses the thought processes of teachers and trainees (student teachers) of the Belgian French Community. The data collecting techniques were journal keeping, thinking aloud, classroom videotaped observation, interviews, and stimulated recall. A content analysis of the data was then performed to derive the planning and interactive decisions made and the reasons put forward for these decisions. Most decisions focused on teaching technique and educational strategy. The decisions made during the planning were also categorized as organizational ones (material, time schedule) whereas during interaction they were also qualified as transitional (sequencing and linking of activities) for the teachers and essentially managerial for the trainees (classroom management). Even if teachers and trainees mostly don't explain their planning decisions, the reference for these decisions are the pupils (their performance, participation, behaviour …) or the educational context (available time, parents, external context as for example inspections' or teacher trainers' requirements). However, they differ in the first argument: teachers refer mostly to personal needs, impressions and interiorized routines whereas trainees refer to the activity (objectives, complexity …), its flow and the attainment of the trainers' standards. Interactive decisions are mostly explained with factors referring to pupils and activity flow. Both teachers and trainees make interactive decisions according to a steering group of pupils who seem to understand or to master the taught skill or content. The principal focus of the trainees is to implement the planned lesson to reach the assessment standards of their trainers. Data also show that the trainees don't like the pressure of the evaluation standards. They declare that these standards impede free decision-making and their own professional development. This demonstrates the need to improve the training and the associated assessment standards.

Development of teacher students' pedagogical thinking and practice
Sari Yrjanainen, University of Tampere, *Finland*
Marita Makinen, University of Tampere, *Finland*
Arja Lundan, University of Tampere, *Finland*
Eero Ropo, University of Tampere, *Finland*

Purpose of the paper is to investigate teacher students' pedagogical thinking about class teaching and their actual teaching practice during the teacher education. Theoretical framework is based on socio-cultural and socio-constructivist approaches that emphasize the importance of contextuality in knowledge construction. We aim at finding out 1) how student teachers describe their conceptions of learning and scaffolding and how these conceptions change during the academic year of teacher education, 2) how subjects describe their teaching behavior in the class situations and how they reason about their pedagogical thinking during the lessons, 3) how students position themselves as teachers during the lessons. Our qualitative data consisted of narrative essays by mathematics teacher students. The texts were analyzed as narratives. The data of the selected students were collected in February 2006 and 2007 during the authentic teaching situations at the practice schools. The students' practice lessons were videotaped and the data were collected on the scaffolding of school pupils in those situations. After the videorecording the researcher watched the recording with each student using the think-aloud method. The analysis is based on the hermeneutical and autobiographical approach and we have used discourse analysis also. Students' conceptions of pupil learning were classified into five categories. Results of the video analyses from 2006 showed that the selected five students could be categorized into three classes. The results showed that students were in the phase in which their idea of teaching seemed to be in the level of teaching the subject matter; in this case mathematics and science. The results will benefit both the processes of curriculum planning for teacher education and mentoring processes during the students' teaching practice.

Novice teachers: Strengths and difficulties as perceived by physical education beginning teachers and interpreted by teacher mentors
Ella Shoval, Zinman College of Physical Education & Sport Scien, *Israel*
Ilanan Erlich, Zinman College of Physical Education & Sport Scien, *Israel*
Naomi Fejgin, Zinman College of PE & Sport Sciences at Wingate I, *Israel*

The goal of this study was to portray the strengths and the difficulties of novice physical education teachers as perceived by the teachers themselves and to analyze the significance of the findings. Data was collected by open-ended questionnaires and structured interviews that were conducted with 62 physical education beginning teachers. The analysis regarding the significance of the data was performed by 24 teacher mentors, who were participating in a special course for teacher mentors. The analysis was performed in small groups, and the significance that the mentors attributed to the findings was validated and corroborated by findings from the research literature. It was found that the physical education beginning teachers face similar difficulties as their counterparts teaching academic subjects. Five characteristics of physical education beginning teachers were defined: (1) Novices sense a high degree of dependence. (2) Novices ignore the wider educational circle. (3) Novices emphasize the importance of values. (4) There is a gap between the novices' eagerness to initiate activities and the environment's lack of appreciation for such initiatives. (5) Novices have limited knowledge of practical pedagogy. Three needs emerge from the findings: (1) the right to make mistakes in independent decisions and the right to get suitable support to foster professional development, (2) harnessing theory to practice and acquiring the capability to construct the links between them independently, (3) and opportunities to acquire

methods to enable the beginner to teach values. The article recommends considering ways to provide for these needs in teacher training and in the induction of new teachers in the schools.

Developing subject pedagogy using video and transcription as tools for reflection: impact on student teachers' immediate and potential professional learning
Rachel Lofthouse, Newcastle University, *United Kingdom*

Video-recording provides opportunities for practitioners to act as observers of their own practice, and develop deeper awareness of the nuances of interaction and discourse. As such it provides opportunities for reflective practice (Schon, 1983) and situated learning (Lave and Wenger, 1991). The paper explores the scope of a video / transcription intervention as a mediating tool in the development of student teachers' understanding of subject pedagogy; and evaluates the professional learning opportunities afforded by peer review between novice teachers of the outcomes of the intervention. Data is drawn from mixed methods case study research conducted between 2005 and 2007 involving student teachers following Newcastle University's one year Master's level Initial Teacher Education course. Interim findings suggest that video / transcription intervention can engage student teachers in reflective practice and knowledge construction, as they develop an understanding of the role of language in teaching and learning (Rodrigues & Thompson, 2001), and how classroom discourse can promote subject specific learning in the classroom (Chin, 2006). The intervention provides an opportunity for student teachers to engage in workplace studies (Luff et al, 2000). It can also be considered as the instrument or tool influencing the outcome of the object of learning to teach. In this way it can be understood as part of the dynamic system described by Engestrom (2001) as Activity Theory. Significantly the research also suggests that the use of video and associated analysis by student teachers enhances their willingness to engage in professional learning initiatives using video once they are employed as teachers, by stimulating a positive and productive approach to engagement in initiatives such as teacher-enquiry and coaching in their early career.

N 13
31 August 2007 16:00 - 17:20
Room: 1.71 Pócza
Paper Session

Teacher professional development

Chair: **Fritz Oser,** University of Fribourg, *Switzerland*

Activity Theory as a framework for understanding inservice teachers' approaches to technological innovation
Ilias Karasavvidis, University of Thessaly, *Greece*

Despite promises and expectations, the introduction of ICT in educational systems has failed to transform educational practice. Given the crucial mediating role of the teacher, teacher training in ICT is of essential importance. As a rule, teacher training in ICT is insensitive to contextual factors, failing to address teacher needs, thoughts, and practices. However, it is precisely those practices which will eventually determine the role of ICT in classrooms. Thus, it is important to inquire how teachers think about technology in relation to their practice. Activity Theory

constitutes a valuable framework for the study of transformations of collective practice. The present paper aims to conceptualize teacher views about technological innovation through the prism of Activity Theory and determine the implications for in-service teacher ICT training. Fifty elementary school teachers attended a 30 hour in-service training course on the educational applications of the internet taught by the author. CSCL was one of the three main course modules upon which the course focused. Three main questions about CSCL were posed by the author in the course forum. Teacher views were recorded through their participation in the forum discussions of those questions. Teacher responses were content analyzed and coded in a number of themes which emerged from the forum discussions. Overall, while teachers favored the integration of CSCL into their daily practices they also expressed skepticism about the essential prerequisites of successful CSCL integration. Time emerged as a common pattern from the analysis of teacher responses and was manifested in their discourse as a vague, multifaceted ''enemy''. The conceptualization teacher views in terms of Activity Theory revealed a contradiction within the teacher object of activity: covering the material vs. student learning. It is concluded that in-service teacher training in ICT should also take into consideration teachers' perspectives, concerns and practices.

Towards a model of mentor teachers' roles in dialogues with prospective teachers
Paul Hennissen, Fontys University of Applied Science, *Netherlands*
Frank Crasborn, Fontys University of Applied Science, *Netherlands*
Niels Brouwer, Radboud University Nijmegen, *Netherlands*

Mentoring dialogues play an important role in the supervision of prospective teachers. Mentor teachers have the dual role of guiding the students in the workplace and of stimulating students to reflect and learn from their teaching experiences. Does this happen in practice? This study describes the supervisory behavior of mentor teachers during their mentoring dialogues with prospective teachers by analysing 4 aspects of the dialogue: content, mentor teachers' role, the phases and time. There were three phases in the analysis of the literature. The results indicate that while teachers are effective in the guidance of prospective teachers in the workplace, they are not so effective in the area of stimulating reflection in the prospective teacher. In the mentoring dialogues it is usually the mentor teacher who is the dominant interlocutor; raising issues of organization, directing the prospective teacher in a prescriptive manner, deciding the content of the dialogue, not structuring the dialogue in phases and doing most of the talking. However, studies in this area vary greatly in the presentation of the issues and offer little coherence or correlation. So after looking at the literature, we propose a model where the roles of the mentor teachers can be categorised and where the data collected can be correlated with the existing literature.

Habits of hope – seeking a sound rationale for teachers' professional practice
Husu Jukka, University of Helsinki, *Finland*

This study brings the concept of hope to bear on the processes of education in ways that directly impact the practices of schooling. Hope is commonly regarded as an unrealistic idea and assumed to be unrelated to the everyday school life. Within our prevailing ethos of standardization and quantification, it is difficult for teachers to convince others that such idealistic notions as hope crucially affect students' well-being and achievements in schools. This paper argues that hope bears not only moral value in teaching but it is actually a workable rationale for teachers' pedagogical practice. The paper explores the ways in which the habits of hope contribute to the character and development of teachers' professional knowledge. Drawing from the empirical data of 132 primary school teachers, the paper identifies three related aspects of hope as teachers' pedagogical rationale: self-related hopes, tasks-related hopes, and impact-related hopes. The paper

presents how each of these three habits of hope operates and structures the teacher's pedagogical perspective and actions. The results illuminate hope's practicality: its capacity to promote the growth of teachers' abilities and to keep them actively oriented towards possibilities in their everyday teaching practice.

Interpersonal processes affecting mentoring practices
Yehudit Od Cohen, Ohalo College for teacher education, *Israel*

In recent years there has been an increase in the use of mentoring as a paramount means for facilitating the learning and development of teachers. However, limited literature exists regarding the contribution of the interpersonal dimension to the quality of mentors' practice from a research perspective. This study examines the contribution of the interpersonal dimension to effective mentoring practices. The data used in the analysis are from practicing mentors, inspectors, and mentored teachers, located in Northern Israel, and collected during the academic year of 2002-2003. The results indicate that improving the interpersonal capacities of mentors may facilitate success in mentoring teachers, and reinforces the view that the interpersonal dimension in mentoring is an influential element in effective mentoring, whose weight is equal to that of the mentor's subject matter knowledge.

N 14
31 August 2007 16:00 - 17:20
Room: 0.100A
Paper Session

Instructional design

Chair: **Charoula Angeli,** University of Cyprus, *Cyprus*

Does Motivation affect Cognitive Load?
Steffi Domagk, University of Erfurt, *Germany*
Steffi Zander, Georg-August-University of Göttingen, *Germany*
Helmut Niegemann, University of Erfurt, *Germany*
Roland Brunken, Saarland University, *Germany*

Cognitive Load Theory (CLT) is frequently applied to explain distinct effects in instructional design research (Chandler & Sweller, 1991). Recent research on CLT has shown that prerequisites of the learners, like prior knowledge or spatial ability, have to be taken into account (Bruenken et al., 2000; Kalyuga et al., 2003). This holds for cognitive learner prerequisites, whereas motivational prerequisites have been widely neglected so far. Interested in the relation of motivation and cognitive load, we examine two basic research questions: (1) Does motivation affect mental effort during learning with computer-based learning material? (2) Do high motivated learners report higher mental effort than low motivated learners? Paas et al. (2005) assume that motivation, mental effort and performance are positively related. In consideration of the difficulty of the instructional design condition, we state more specific hypothesis. We therefore review two experiments from different areas of instructional design research. In both studies motivation was measured in the beginning of the learning process and mental effort throughout it. The results indicate that motivation does positively affect mental effort. They further support the assumption

that the instructional design difficulty has to be taken into account when examining the influence of motivational learner prerequisites on mental effort.

Understanding of chemical and physical change: a study with pre-service teachers
Ingrid Martorell, University of Lleida (UdL), *Spain*
Manoli Pifarre, University of Lleida (UdL), *Spain*
Susana Godia, University of Lleida (UdL), *Spain*
Anna Gene, University of Lleida (UdL), *Spain*

Understanding the distinction between physical change and chemical change is a basic concept that is important for the understanding of chemistry (Solsana, et al., 2003). Students have historically showed poor understanding of chemical and physical change. The main goal of this work is to design, implement and evaluate an instructional approach for science pre-service teachers to help them move towards a conceptual understanding of physical change and chemical change. A detailed description of the instructional approach is presented. Preliminary results showed that post test scores are significantly higher than pre test ones (t=-4,14; p=0,001, n=20). Qualitative assessments indicate that students in the post test improve in writing scientific explanations and referred correctly to some difficult concepts like matter, energy, reversibility, chemical reaction, dissolution, and macroscopic and microscopic level.

Plotting effective instruction: Context-specific relationships between instruction and gains in reading comprehension
Stuart McNaughton, University of Auckland, *New Zealand*
Meaola Amituanai-Toloa, University of Auckland, *New Zealand*
Shelley MacDonald, University of Auckland, *New Zealand*
Mei Kuin Lai, University of Auckland, *New Zealand*
Sasha Farry, University of Auckland, *New Zealand*

Generally we know what makes good comprehenders and features of effective teaching of reading comprehension. But idiosyncratic needs exist for effective teaching and learning in particular instructional contexts. We plot relationships between teaching and achievement over two large scale three year interventions in two clusters of seven schools serving minority communities (120 teachers and 3000 students). Classroom observation and achievement data were collected within a quasi experimental design. Relationships between teachers' behaviour and achievement, and case studies of highly effective and less effective classrooms are used to show that attributes of teaching, including increased focus on vocabulary, on checking text meanings, and on students' awareness of strategies and tasks, were related to specific areas of comprehension. The patterns illustrate the claims about context specific needs.

Soliciting versus providing explanations of worked examples
Zane Olina, Florida State University, *USA*
Xiaoxia Huang, Florida State University, *USA*
Robert Reiser, Florida State University, *USA*

The study involving 150 American middle school students in an instructional program about comma rules examined two strategies, instructional explanations and self-explanation prompts, for maximizing learning from worked examples. Previous research has shown that worked examples are more effective during initial stages of skill acquisition than conventional problems, yet standard worked examples often fail to facilitate transfer. Several studies focusing on enhancing

learning from worked examples have demonstrated that that providing learners with more in-depth explanations of the solution steps or prompting them for self-explanations are effective in facilitating learning and transfer. The purpose of this study was to examine the relative merits of these two approaches on learner performance, perceived mental effort and attitudes. When instructional explanations were provided, learners performed better on both achievement and transfer tests when they did not also have to provide self-explanations. Yet, when no instructional explanations were present, learners who were prompted to self-explain did better than learners who did not receive such prompts. The presentation will discuss implications of these and other findings.

N 15
31 August 2007 16:00 - 17:20
Room: 0.99
Paper Session

Higher education

Chair: **János Steklács,** Teacher-Training College Kecskemét, *Hungary*

Quality indicators for PhD theses in Engineering
Sid Bourke, University of Newcastle, *Australia*
Allyson Holbrook, University of Newcastle, *Australia*
Terence Lovat, University of Newcastle, *Australia*

Engineering education is facing a crisis across the board in western nations as demand for such courses declines but demand for engineers and engineering research is growing apace. Given the national interest implications of the engineering discipline, there is intense debate about the nature of doctoral education in this climate. This study utilises examples of text drawn from 165 examination reports for 65 engineering PhD theses, and the recommendations the examiners make on the fate of the thesis. The extent to which engineering theses can be ranked on the basis of quality indicators grounded in examination text analysis and linked to examination outcome is described and discussed. Given that more than half the examiners of engineering theses are located outside Australia, comparisons are made between examiner comments and recommendations by country/region. Comparisons are also made between examination comments made by academic Engineers and by industry professionals, in terms of the nature, agreement and consistency of quality judgements. The significance of the study resides in its contribution to examiner judgement literature while setting the stage for studies of alternate models of research training to maximise outcomes for the engineering profession.

Perspective on the dynamics of collaboration between Higher Education researchers and practitioners: a case study from the history strand of the ETL Project.
Kate Day, Univeristy of Edinburgh, *United Kingdom*
Charles Anderson, University of Edinburgh, *United Kingdom*

Given the strong emphasis within current educational research in the UK and elsewhere on the importance of working in partnership with practitioners, this paper examines what is entailed in enabling and nurturing such collaborations and what factors may create gaps between rhetoric and

reality. It draws on the experiences of a collaborative partnership in higher education within the history strand of a large-scale extended project concerned with enhancing teaching and learning in undergraduate courses (ETL project). In addition to analysing, from the perspectives of both the practitioner and researchers involved, the main issues which arose, the paper illustrates the effects of collaboration on the development of a course design which was more congruent with students and fostered engagement with key module purposes. The aim of the paper is to make a case-study contribution to understanding how higher education research that involves partnerships with practitioners can be rendered less problematic and the collaborative process sustained over time.

The personal study plan and students' spontaneous descriptions of study practices and strategies
Anne Haarala-Muhonen, University of Helsinki, *Finland*

The aim of the study is to explore students' spontaneous descriptions of their study skills by using the open-ended personal study plan (PSP). The University of Helsinki and the Faculty of Law implemented PSP as an instrument for study. The participants of the study were 240 first-year law students. Legal education has very strict curriculum and students do not have a possibility to select their courses which comprise the Bachelor degree. Instead, they have to plan their study schedule and decide how to best study for extensive examinations. Therefore, the PSP was used in two ways. Firstly, the students designed their study with PSP which included their study progress and schedule for bachelor degree. Secondly, they answered open-ended questions about their motivation to study legal education, their study skills, life control and visions for the working life. The results showed that assessing own study skills were new and difficult for many students. Most students described their study skills at a general level. One reason was that there had not been any need to analyse own study skills, because of previous good study success. Some of the students could give more specific descriptions about their learning and the use of study strategies. The results further showed that from the perspective of student counselling, the use of the open-ended PSP gave important information of students' study skills. The PSP brought out the lack of self-regulation. Although the law students' prior experience of learning is usually very good, students were uncertain about their skills to find relevant information and to learn a lot of new information in a short period of time.

Doctoral examiner ego and assessment etiquette
Allyson Holbrook, SORTI, The University of Newcastle, *Australia*
Sid Bourke, SORTI, The University of Newcastle, *Australia*

Doctoral examination involves so much more than an evaluation of the thesis. Examiners are presented with guidelines, but are essentially free to 'approach' examination of a thesis as they see fit. Drawing on the text analysis of more than 2000 examiner reports, this paper reports the range of differences in 'approach' to report writing and mines the rich vein of personal information, position and opinion that examiners embed in their reports, including comments on process, references to supervision and indications of their own contribution to the field. Examiner reports are complex documents that capture academic culture, assessment language and assessment etiquette. But if an examiner uses a report for something more than direct comment on the thesis, does this impact on the way it is viewed by the intended audience of supervisor, candidate and committee? Does it undermine the assessment or enhance it? After quantifying the coded data we explore the extent to which 'personalised comment' predicts examiner recommendation.

N 16
31 August 2007 16:00 - 17:20
Room: 0.100B
Paper Session

Student learning in higher education

Chair: **Richard Joiner,** University of Bath, *United Kingdom*

The influence of instruction and assessment on the acquisition of oral presentation skills
Luc de Grez, Vlekho Business School, University of Leuven, *Belgium*
Martin Valcke, Ghent University, *Belgium*
Irene Roozen, Vlekho Business School, University of Leuven, *Belgium*

In this study we have analysed the effect of 'modes of feedback' and investigated if a standardised instruction on computer can enhance presentation skills and if 'assessment by peers' is an alternative for 'assessment by the teacher'. Participants (n=59 first year university students) delivered three presentations in standardised conditions and filled in two questionnaires whereby several characteristics and perceptions of students were measured. In the instructional part we studied the effect of a standardised multimedia instruction and the effect of three modes of feedback (by professional, peers and self-assessment) on performance. For the assessment part all the videotaped presentations were assessed by professional assessors (four members of the faculty and one student-researcher) and some also by peers and by the participants. A rubric with nine criteria was used for the assessment. Results of the instructional part show that performance was significantly better after the instruction than before, but we could not find a significant impact of 'mode of feedback' on performance. As for the assessments, the average total rubric score of professional assessments is significantly lower than self assessments and significantly lower than peer assessments, although there is a positive correlation between professional assessments and peer or self-assessments (even significant correlations for about half of the criteria). The assessments of the student researcher are in line with the assessment scores of the professionals: no significant difference could be found. A regression analysis gave two significant predictors of performance: self efficacy and the likeability of instruction and learning. Some of the results could mean a lot for teachers if they are confirmed in future research. Peer assessments and even self-assessments could replace some of the time consuming teacher assessments and the standardised multimedia instruction could help the teacher.

Threshold concepts and troublesome knowledge (5): implications for assessment.
Ray Land, University of Strathclyde, *United Kingdom*
Jan H. F. Meyer, University of Durham, *United Kingdom*
Sian Bayne, University of Edinburgh, *United Kingdom*

The analytical framework of threshold concepts and troublesome knowledge (Meyer and Land 2006) has argued that, in student learning terms, there is posited variation in progressive stages of a student's journey towards a conceptual portal, and through a liminal state of transformed understanding. This paper argues that such a perspective now requires a more nuanced and generative model of assessment to help us purposefully identify variation in progress and understanding at preliminal, liminal, postliminal and subliminal stages of conceptual and epistemological fluency. A further sufficient condition of such a revised assessment practice is its accommodation of the shifts in epistemology and the more complex forms of textual mediation

which higher education is experiencing in the early 21st century through its interface with digital technologies. It is against, and through, such shifts that transformation in student understanding is now frequently positioned. Such developments place increasing emphasis on collaborative modes of enquiry, the importance of self-regulation and self-explanation, process as against artefact, consensus as against authority, and exploration as against argument. The transformed conceptual understanding of students is also imbricated within streams and flows of information leading to fast and continual processes of revision, amendment, and truncation leading in some cases to almost permanent states of rethinking and emergence and offering only provisional stabilities. The paper argues, from analysis of empirical data gathered from UK funded projects implementing the thresholds framework, that such reconsidered assessment practice offers important dimensions to identify at which points, and in what ways, individual students might experience conceptual difficulty and experience barriers to their understanding. Used as a set of analytical lenses we argue further that these modes of variation and revised assessment criteria present an insightful conceptual basis for developing new and creative methods of assessment and can inform course (re)design in generative and sustainable fashion.

Peer mentoring in higher education: a qualitative analysis of the epistemic basis to how mentors teach and how mentees learn
Shaheeda Essack, Departmen of Education, *South Africa*

The peer mentor programme was established as an attempt to address the high failure and attrition rate among first-year academically under-prepared students at the Westville campus of the University of Kwa-Zulu Natal. Among the challenges facing students and the institution are issues of alienation, socio-cultural diversity, academic under-preparedness and economic inequality. The aim of mentoring was to ensure that high-risk students are equipped with the requisite knowledge, skills and attitude to survive in a highly competitive higher education environment, and beyond. This paper is located within Urie Bronfenbrenner's (1993) ecology model of human development and reports on the how, why and what of student development as against the person-process dimensionand the role of peer mentoring in intricately linking disciplinary and personal epistemologies vis-à-vis the four developmentally instigative characteristics:inviting behaviour versus inhibiting behaviour, selective responsitivity, structuring proclivities and directive beliefs. The evaluation of the impact of peer mentoring was conducted through the dissemination of questionnaires to mentees and focus group interviews held with mentors. This paper focuses on the qualitative feedback received from mentors/mentees,which was analysed in terms of content/thematic analysis and discourse analysis. Whereas Megginson & Clutterbuck (1997: 13) define mentoring as leading to massive shifts in knowledge skills and attitude, the results indicate that such quantitative shifts are accompanied by qualitative shifts as well. The actual teaching and learning that transpires on the ground between two or more peers results in altered and transformed ways of perceiving and engaging with one's environment in a manner that creates balance and reconciliation. Of necessity to the why, what and how students learn is the need to take into account disciplinary and personal epistemologies.

Algorithmic understanding and threshold functions: exploring students' conceptual understanding of calculus
Max Scheja, Stockholm University, Department of Education, *Sweden*
Kerstin Pettersson, University of Skovde, School of Life Sciences, *Sweden*

The study explores the nature of students' conceptual understanding in relation to 'threshold concepts' in mathematics. Twenty students of engineering were asked first to rate their own

understanding of the concepts of limit and integral, and then to reflect in writing on the meaning of these concepts. A sub-sample of four students was selected for subsequent interviews exploring in greater detail individual students' conceptual understandings. Intentional analysis of the students' written and oral accounts revealed that the students were communicating their understanding of limit and integral within an algorithmic context, in which the very 'operations' of these concepts were seen as crucial features. The students also displayed great confidence in their ability to deal with these concepts. It is argued that developing understanding within an algorithmic context can be seen as a stepping stone towards developing a more complete conceptual understanding of calculus. These results are discussed in relation to on-going research on threshold concepts in higher education, and it is suggested that while the notion of threshold concept points up potential difficulties involved in coming to understand particular parts of a subject area, the notion of 'threshold function' offers an opportunity to explore difficulties and potentialities of students' learning from the contextually sensitive perspectives of the students themselves.

N 17
31 August 2007 16:00 - 17:20
Room: 0.79 Jánossy
Paper Session

Comprehension of text and graphics

Chair: **Zoltán Tóth,** KLTE, *Hungary*

An exploration of students' semantic understanding of 'kind-of/part-of' discourses
Wen-Gin Yang, Graduate Institute of Science education, NTNU, *Taiwan*
Shih-Wen Chen, Graduate Institute of Science Education, NTNU, *Taiwan*

This study aimed at exploring different levels students' understandings of the 'kind-of/part-of' relations of science objects described in science text. To describe such relations variety of discourses, ranging from explicit to implicit, could be deployed. In doing that ambiguities would be encountered when readers trying to make sense of the relations among objects. A text of blood was excerpted from current junior high science textbook as the target text. The text comprises of five sentences, 157 Mandarin characters, and 13 events in the sense of transitivity analysis; an instrument of 25 items was constructed by rewording or transforming the kind-of/part-of discourses into kind-of or part-of ones. Totally 329 subjects, 142 7th graders, 149 9th graders, and 38 pre-service and in-service science teachers, participated in this study. They were asked to read the blood and then answer the questions with permission to refer to the blood text. The reliability (λ5) is 0.76. Major quantitative findings include: (1) readers interpret the semantic meaning differently even for cases of explicit kind-of/part-of discourses; (2) in cases of implicit discourses the variation of interpretation increased; (3) significance differences were observed across different levels of readers; (4) readers inclined to perceive the part-of relations among science objects as 'ingredient/compound' or 'compositional' ones. The reasons of readers' interpretation were also analyzed qualitatively. Finally, the implications of the findings for science text writing and science teaching were discussed.

Visualization and verbalization of text content: Effects of strategy instruction on science text comprehension

Claudia Leopold, Duisburg-Essen University, *Germany*
Detlev Leutner, Duisburg-Essen University, *Germany*

Theories of multimedia learning emphasize the importance of integrating verbal and visual information for text comprehension (Mayer, 2005; Schnotz, 2005). However, verbal and visual information relate to different representational formats, which are not easily integrated. Rather students need support to translate and actively form referential connections between representations (Ainsworth, 1999). While these processes were mainly studied using text and presented pictures, they should especially be activated by instructions to construct visual representations while reading a text. Two experiments were conducted to examine whether instructions to visualize and/ or verbalize text content help students when reading a science text. Both experiments followed a 2x2 research design, with visualization strategy (yes vs. no) and verbalization strategy (yes vs. no) instruction as experimental factors. The visualization instruction aimed at fostering the construction of a visually based representation, the verbalization instruction – selecting main ideas (Exp. 1) and summarising text content (Exp. 2) – aimed at fostering forming a verbally based representation, and the integrated strategy instruction combines both strategies and aimed at fostering integrated representations. A no-instruction group was included to provide a baseline for comparison. The main dependent variable was science text comprehension, measured by a multiple-choice and a transfer test. 92 (Exp. 1) respectively 77 (Exp. 2) students (grade 10) participated in the study, randomly assigned to one of the four treatment groups. After studying the science text, students filled in the multiple-choice and the transfer comprehension test. The results showed positive effects for visualization instructions, negative effects for verbalization instructions, and no interactions. In general, the results are in line with current multimedia learning theories. However, they raise the question whether transformation or integration of representations is the main cognitive process of multimedia learning for science text comprehension.

Backward inferences and the role of goal structure in auditory and audiovisual presentations of narrative texts

Unsoeld Ilka, Department of Psychology, *Germany*
Nieding Gerhild, Department of Psychology, *Germany*

Although inferences are seen as a necessary part of text comprehension (Kintsch & van Dijk, 1978) only a few studies on such inferences have concentrated on children. In this study, we investigated backward inferences kindergarten children draw on- and offline. To compare their abilities with older age groups, 8-year-olds, 10-year-olds and adults were also tested. One hundred twenty eight participants were presented a number of narrative texts in auditory and audiovisual form. After each story a probe word was presented which could be linked either to a global inference, a local inference or which served as a distractor word. Participants had to decide whether the probe word had occurred in the story or not. Since goals can help to maintain global coherence in a text (Suh & Trabasso, 1991), half of the texts included a goal structure. To measure inferences offline, we used free recall questions in a story containing superordinate and subordinate goals. The questions could be answered either with a local or a global inference. In the online measure, 6-year-old children primarily generated local inferences whereas there was no difference between local and global cause answers in the offline measure. In contrast, for 8-year-olds, more local than global inferences were found in both online and offline measures. The same pattern was observed for the two older groups in the online measure, whereas they indicated more global causes in the offline measure. Moreover, generation of global inferences could be fostered

by goal structures in 6-year-olds and by aural presentation in 10-year-olds. Results will be discussed within a developmental framework with reference to media comparison and mental effort theories.

N 18
31 August 2007 16:00 - 17:20
Room: 0.83 Eötvös
Paper Session

Computer-supported learning environments

Chair: **Loucas Louca,** University of Cyprus, *Cyprus*

What's the function of an electronic guidebook for museum learning? An in-depth analysis of visitors' visiting behavior
Yao-Ting Sung, National Taiwan Normal University, *Taiwan*
Yi-Hsuan Lee, National Taiwan Normal University, *Taiwan*
Kuo-En Chang, National Taiwan Normal University, *Taiwan*
Ruei-Lin Wang, National Taiwan Normal University, *Taiwan*

Museum is one of the most important institutions providing students to explore knowledge and develop different interest in an informal learning setting. As information and communication technology becomes more popular, many researchers have also become concerned on how to use this significant tool to support the museums' functions of social education and lifelong learning. However, despite the popular use of mobile electronic guidebooks in museums, many fundamental questions, such as the roles visual/audio guidebooks play in visitors' visiting, the systems' efficacy in promoting the interaction between visitors and exhibits, if the guidebook will change visitors' behavior pattern, etc., remain unexplored. This study designed a mobile electronic guidebook and conducted an experiment to compare two visiting modes: visiting with the electronic guidebook and visiting without any supplementary tools. Twenty-two college students participated in the study were invited to visit the Tang Dynasty's Tri-Color Glazed Pottery exhibition at the National Museum of History. The results showed that the students with the electronic guidebook had on average a longer holding time with exhibits than the students without supplementary materials. The sequential analysis of visiting behaviors also showed that the students with the electronic guide system displayed more attentive, directional, and consistent behaviors in interacting to the exhibits.

Content understanding using web information in secondary education
Manoli Pifarre, Universität de Lleida, *Spain*
Ingrid Martorell, Universität de Lleida, *Spain*
Susana Godia, Universität de Lleida, *Spain*

Early research on using Web information indicated that secondary students did not explore much and used Web tools naively and they had high difficulties to understand and integrate Web information. In response to these challenges, the main goals of this research are addressed to design, implement and evaluate and instructional approach that helps students learn from web information. We developed on-line learning materials which focus on specific curricular contents

and provide specific scaffolds to help students accomplish web-based tasks and develop specific web strategies. These scaffolds pretend to give support students' information-seeking activities as they asked question of interest, searched for information, organised and assessed their findings, and created rich representations of their newly constructed understandings. We designed a yearlong study to investigate the depth and accuracy of 127 secondary students' content understanding as well as their development of searching and managerial strategies as they utilized on-line resources to solve instructional tasks. Our research found experimental group students performed statistically better the computer-based activity than control group students. Besides, findings suggested that students were able to develop accurate and in-depth understanding from Web information if they could appropriately use search and managerial strategies. This research lends evidence to questions regarding the value of students engaging in on-line inquiry learning to enhance content understanding and to develop more efficient searching and managerial web-information strategies in Secondary Education.

Learning and Instruction in a computer supported environment - The power of natural framing
Annika Lantz-Andersson, Göteborg University, *Sweden*

The aim of this paper is at analyzing how students frame their activity and create meaning, in a computer-supported learning environment. The research is based on sociocultural assumptions of learning (Wertsch, 1998; Säljß, 2005) and Goffmans (1974/1986) concept of frames. The setting is an upper secondary school where students work with educational software and the research questions addressed is how do students frame their activity and create meaning when they are solving computer supported problems and how do the students maintain the activity when they face tasks that are troublesome? The result implicates that students use different agendas for maintaining the activity in the digital environment and they are left in-between frames of the mathematical content and the digital design. This could be understood as an ambiguity of framing which means that the students could either turn to the natural framing i.e. the drawback has to do with the educational software or to the social framing i.e. they themselves are playing an active roll in their understanding of the task. In framing the situation within a natural framework the students are able to maintain their social status and their level of attainment in the school context. Thus the digital environment adds further to the complexity and gives yet another dimension for the students to act within but also offers a way of framing the activity with tasks that are troublesome beyond their own competence.

Supporting collaborative learning by pre-structured external representations
Bernhard Ertl, Universität der Bundeswehr Munchen, *Germany*
Heinz Mandl, Ludwig Maximilian University, *Germany*

External representations can be powerful in supporting learners when they are solving cases collaboratively. They can focus learners on aspects which are particularly important for the solving of a given task. In this study, we investigate different styles of pre-structuring shared external representations: collaboration scripts and content schemes. 53 triads of university students were assigned to four experimental conditions involving the factors collaboration script and content scheme. Results show that learners benefit particularly from the content scheme. The scheme was able to focus learners' collaboration on particular content categories necessary for their task solution. Furthermore, learners' outcomes benefit from the content scheme.

N 19
31 August 2007 16:00 - 17:20
Room: 1.60
Paper Session

Learning environments

Chair: **Edit Katalin Molnár,** University of Szeged, *Hungary*

Creating retroactive and proactive interference in multimedia learning
Richard E Mayer, University of California, Santa Barbara, *USA*
Krista Deleeuw, University of California, Santa Barbara, *USA*
Paul Ayres, University of New South Wales, *Australia*

When students learn how a physical system works, does it help if they also learn how similar systems work? Some college students (concise group) studied a multimedia lesson that explained how hydraulic brakes work, consisting of narrated animation or annotated illustrations. Others (expanded group) received the same lesson along with multimedia explanations of caliper brakes and air brakes presented either after (Experiment 1) or before (Experiment 2) the explanation of hydraulic brakes. Across the combined experiments, students performed worse on retention (d = .37) and transfer tests (d = .30) concerning hydraulic brakes if the lesson also contained lessons on caliper and air brakes; within each experiment, the effects were statistically significant in Experiment 1 (d = .57 and .53, respectively) but not in Experiment 2 (d = .23 and .17, respectively). Students performed similarly with narrated animations and annotated illustrations. These results suggest that if students are expected to learn about a specific system, using examples about related systems can depress learning, particularly in the form of retroactive interference (in Experiment 1). These results extend the coherence principle, i.e. the idea that adding extra material to an explanation can interfere with learning. There was no evidence to support converting static graphics into animation.

Teachers' expectations on the Playful Learning Environment (PLE)
Pirkko Hyvonen, University of Lapland, *Finland*

This paper reports the expectations of a selection of educators concerning the playful learning environment (PLE). The PLE is an outdoor playground designed for learning and growing through play. The pilot PLEs were constructed in Finland, but the concept is intended for distribution abroad as well. Therefore, educators' views are needed. Teachers (N = 14) from pre-primary education to the fourth grade were interviewed to sort out their practices and expectations of teaching, playing, and learning in the PLE. The grounded theory approach was used in coding and theory building. The teachers' expectations concerning playful learning environments are related to implementation, play, learning, curriculum, and suspicions. Implementation means that the PLE provides alternative learning environments for teaching and learning. Play refers to an imaginary context, which facilitates and inspirits playing at school. Learning is related to the emotional, social, and cognitive benefits that activities in the PLE can convey. The PLE is expected to afford a more flexible adaptation to the curriculum. Finally, suspicions signify critical views, which have to be considered as well. There are critical opinions about whether the PLE is really needed or worth further investments. On the whole, the teachers' expectations relate to teachability, playability, and learnability. I will clarity these concepts in my later studies and test how the experiences with the PLE correlate with them. Teachers, teacher educators, PLE designers and

manufacturers would benefit from this study. In addition teacher's views are essential in designing pedagogically meaningful contents for the PLE and in developing PLEs that meet the challenges of the future school.

Virtual environment as a means to extend distributed cognition
Maria Beatrice Ligorio, University of Bari, *Italy*
Donatella Cesareni, University of Rome, *Italy*
Sabine Pirchio, University of Cagliari, *Italy*

Virtual environments are able to extend the space of interaction beyond the classroom. In such extended space the distributed cognition process may be re-shaped. To understand the effects on distributed cognition of being exposed to a virtual community the Euroland project is analysed. Euroland is a virtual land created and populated for nine months by students, aged from 9 to 14, and teachers of seven classrooms supported by a team of researchers, interacting both on-line and in presence. Participants were located in different cities of two countries – Italy and the Netherlands. At the end of the project the initial empty virtual world was filled by many virtual houses. The virtual space used was composed by a three-dimensional software (Active Worlds) based on chat and avatars, combined with a web-discussion forum called Knowledge Forum. One classroom – composed by students 13 years old – was observed during the whole project. Seven videotapes were recorded in this classroom. Through these videotapes we could trace the development of the project and a good array of different in-classroom and on-line activities were captured. Transcripts of the videotapes were codified through a category system able to trace relevant aspects of the distributed cognition process. In particular two aspects are studied: a) the turn-taking and the addressee during in-classrooms activities; b) the occurrence during the interactions of three episodes (collaboration, legitimization of differences, and reference to the virtual community). These aspects are analysed by looking at the seven videotapes in order to understand the development of the project over time but also by comparing different types of activity(i.e. classroom discussions, hands-on activities, etc.). We found that participation to a virtual community produced two types of effects: made more intense the distributed cognition into the classroom and extended the network of distributed cognition out-side the classroom.

Children's views on the ideal learning environment
Marjaana Kangas, University of Lapland, *Finland*
Heli Ruokamo, University of Lapland, *Finland*

This paper reports an investigation on how schoolchildren view their ideal school and learning environment. The objective of the study was to find out children's views on a school in which they would be happy to study. Children's own perspective on their school environment has not always been taken into account, although we know that as the key participants in education their thoughts should be valued as well. The theoretical background of the study is based on the socio-cultural perspective; learning is seen as a tool-dependent phenomenon whereby people share their experiences of their environment through various forms of communication. The empirical data was collected in autumn 2004 at five comprehensive schools in the city of Rovaniemi, Finland. Children (N = 93), aged 10 to 12, participated in the study by writing about the learning environment of their dreams. The data was analyzed qualitatively using the NVivo qualitative analyzing software. The results show that children would like to study in various places and spaces, and in a variety of ways. The children extended learning activities from the classroom to the outside – to nature and to sporty places. Five main categories and properties were defined to represent the children's ideal learning environment: The school is seen as an extensive learning

environment consisting of physical, social, emotional, virtual, and innovative aspects. The study is part of a wider multidisciplinary research developing innovative learning environments for school education, and constructing the future school concept relating to the following perspectives of learning: formal – informal, physical – virtual, local – global, and distributed – integrated. The children's views have provided valuable insight into designing this theoretical framework for the school of the 21st century.

N 20
31 August 2007 16:00 - 17:20
Room: 0.100C
Paper Session

Professional development

Chair: **Marold Wosnitza,** Universität Koblenz-Landau, *Germany*

Professional learning and development: A synthesis of the evidence
Helen Timperley, University of Auckland, *New Zealand*

This paper synthesises the international evidence related to the effectiveness of professional development for teachers in terms of its impact on student outcomes. A realist synthesis approach was taken for the purpose of answering the question "What works, for whom, under what circumstances?" Ninety-six individual and groups of studies that reported the content and activities of the professional development, met basic methodological criteria and reported student outcomes were located. Effect sizes were calculated to differentiate those studies with substantive impact on students and those with no or low impact. These studies were mapped onto a theoretical framework developed from both the theoretical and empirical literature. Findings are presented in terms of the context in which the professional development opportunities occurred, the content that was learned, the activities constructed to promote the learning, teachers' learning processes and their reactions. In brief, the main discriminator between those studies with greater impact and those with less was the depth of content learned at a theoretical level with specific assistance given to translate the theory into practice, together with the skills of inquiry that enabled teachers to understand whether their changed practice was having the desired impact.

Learning from errors at work and its relationship with team climate and individual error orientation
Johannes Bauer, University of Regensburg, *Germany*
Regina H. Mulder, University of Regensburg, *Germany*

The paper addresses the question under which circumstances errors occurring in the daily work of nurses are used as possibilities to learn. Especially knowledge- and rule-based errors bear the potential for evoking experiential learning and thus for professional development. It is assumed that the engagement in such error related learning requires a safe environment that enables admitting and discussing errors openly, as well as a set of individual orientations that are conductive to such behaviour. The paper reports results from a project incorporating three empirical studies, two of which are completed. For the third, data are collected in the period Oct. 2006 – Jan. 2007. Findings from the first, explorative study indicates that seeking social exchange

and advice from experienced colleagues and supervisors are important activities in order to learn from an error. In the second study, two approaches for the measurement of the engagement in learning activities were developed and compared. The findings indicate that presenting cases of typical errors to the subjects and asking them, in which kind of learning activities they would engage in such a case, seems to be a viable way of assessing error related learning. This method is applied in the third study, in order to investigate whether psychological safety in the work team and individual error orientation are predictors for the engagement in learning activities after an error.

What autobiographical narratives tell about the development of expertise?
Eero Ropo, University of Tampere, *Finland*
Anna-Maija Gustafsson, University of Tampere, *Finland*

Purpose of this study was to investigate experts' descriptions of their own development and learning of expertise. The study is qualitative and applies narrative methodology. The subjects of the study were nine experienced professionals, men and women, who represented different professions. Data were gathered by thematic interviews in which the subjects were asked to tell about their earlier life history, growth, self and identity and learning experiences. Results showed that professional learning seems to have autobiographical roots. Learning was described in the data as a discursive process and several different discourse types could be identified from the narratives.

Perceptions of professional identity and social status among beginning teachers
Poria Kalay, Levinsky College of Education, *Israel*
Bella Gavish, Levinsky College of Education, *Israel*
Malka Kohen, Levinsky College of Education, *Israel*
Hava Gonen, Levinsky College of Education, *Israel*

This study examines the perceived public status of teachers and its role in forming beginning teachers' professional identity. The qualitative research consisted of 30 interviews with beginning teachers and 152 open questionnaires administered to beginning teachers at a college during their internship meetings. The findings indicate low public perception of teachers' status, notwithstanding positive professional perceptions and feelings. Teachers' need to give to pupils and exert professional control helps them cope with the dissonance between public perception and their desire to continue teaching, and with other professional gaps. This study clarifies beginning teachers' difficulties, particularly those deriving from dissonance between perceptions and behavior, offering effective coping methods.

N 21
31 August 2007 16:00 - 17:20
Room: 0.100D
Paper Session

Self-regulation

Chair: **Alexander E. M. G. Minnaert,** Rijksuniversiteit Groningen, *Netherlands*

Do students' goal orientations affect their evaluation of learning and teaching?
Antti-Tuomas Pulkka, University of Helsinki, *Finland*
Markku Niemivirta, University of Helsinki, *Finland*

The purpose of this study was to establish whether students with different achievement goal orientation profiles evaluate their learning and teaching differently. A two-step cluster analysis was used to classify 263 1st and 2nd year students of Finnish National Defence University on the basis of their mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance and avoidance goal-orientations. Analysis of variance was used to examine between-group differences in the evaluation of learning and teaching. Preliminary results indicated significant differences between the identified three groups of students on their ratings of interest, the student's own activities, the student's activeness, pedagogical materials and the teacher's activities. Compared to the others, and especially to students with an indifferent or avoidance-focused goal orientation profile, the mastery-oriented students were most positive in every aspect. The findings of this study add to our understanding of the associations between students` personal characteristics and how they perceive learning and teaching and the learning environment. Instructional implications will be discussed.

Task definition as a facet of self-regulated learning
Dianne Jamieson-Noel, Simon Fraser University, *Canada*

Theoretically task definition is one of the main components of self-regulated learning and is important because one's representation of the task directs cognitive and metacognitive activities. Fifty-eight undergraduate students taking an undergraduate instructional psychology course participated in a semester-long examination of how students constructed and refined their task understanding. Students created a studying portfolio consisting of detailed descriptions about and reflections on strategic processes they used to complete two writing projects. Initial task representations varied in terms of breadth and depth. For breadth, students selected information from the design project description of different grain sizes. Students with greater depth not only searched and selected information from the task, but they actively assembled elements of the task and monitored how those components fit with one another. Most students set goals and created plans; however, not all goals or plans were framed in light of criteria that would foster self-regulated learning. To revise task understanding, students metacognitively monitored their processes and outcomes of learning activities, which updated information about task, cognitive, and motivational conditions. This additional information afforded opportunities for students to reassess the discrepancy between the initial state and the goal state and determine next steps to reach task goals. Although students may have recognized the need to change their approaches, they often failed to engage in effective metacognitive control to adapt approaches to learning. Future research should strive to create new measures for task understanding, and track how

students' perceptions and representations of tasks influence self-regulated learning and achievement.

Beyond inhibition: Cognitive dimensions of self-regulatory behaviour
Mariel Musso, CIIPME-CONICET y Universidad Catolica Argentina, *Argentina*

Attentional mechanisms (Rothbart and Posner, 1994) and the executive or effortful control system play a fundamental role in the emerging self-regulation, making possible more complex functions of problem solving. Adapted to the situation of school instruction-learning, strategies of intervention over the executive control system were designed and evaluated. The sample had a total of 80 children, between 6 and 12 years of age, attending the first year of the General Basic Education at a high poverty-related-risk school. The significant improvements obtained with the intervention in the executive control function are discussed. In addition, the importance of age as a goal-conditioning factor and as an important variable in the early assessment and intervention over self-regulation will be discussed.

Adaptive help-seeking strategies in the inclusive secondary classroom
David Paterson, University of New England, *Australia*

This investigation explored the strategy use of four secondary students with intellectual disabilities, specifically strategies related to adaptive help-seeking. Research into use of adaptive help-seeking strategies (Newman, 2002) has indicated that those students who most need help in the classroom are least likely to seek it. An implication of this is that students with learning difficulties and disabilities who are already failing in classrooms are less likely to use effective learning strategies and are consequently more dependant on assistance from the teacher and from peers. This investigation considered the extent to which these students used adaptive help-seeking strategies in inclusive classroom contexts with a view to identifying instructional approaches which might assist the meaningful inclusion of students with disabilities in regular classrooms. Using non-participant observation and semi-structured interviews with teachers and students, a finding of the study was that students were sensitive to the characteristics of the teacher and were able to describe conditions under which effective help would be provided. Another was that students with intellectual disabilities often made use of peers for help with academic tasks. Explicit instruction in adaptive help-seeking strategies did not occur. By their invitations to the whole class to ask the teacher for help, however, and by suggestions that students ask peers for help teachers were indirectly acknowledging at least two useful help-seeking strategies. It is suggested that for students with intellectual disabilities indirect strategy instruction such as this may be insufficient.

N 22
31 August 2007 16:00 - 17:20
Room: 7.59
Paper Session

Developing potentials for learning

Chair: **Angela O'Donnell,** Rutgers, The State University of New Jersey, *USA*

Preschool children's knowledge of approximate arithmetic
Camilla Gilmore, University of Nottingham, *United Kingdom*
Shannon McCarthy, Harvard University, *USA*
Elizabeth Spelke, Harvard University, *USA*

Young children struggle to perform exact arithmetic and rely on slow, effortful counting procedures involving counters or fingers. However, recent research has suggested that preschool children understand arithmetic when it involves approximate non-symbolic numerical representations (e.g. Barth et al, 2005). We examined whether children are able to harness this ability to perform approximate symbolic arithmetic. In three experiments we investigated preschool and kindergarten children's ability to perform approximate and exact arithmetic with symbolic representations of number. In Experiment 1 we gave a group of 5- to 6-year-olds approximate addition problems presented with symbolic numbers (e.g. If Pooh has 21 candies and gets 30 more, and Tigger has 34 candies, who has more?). The children were able to judge accurately whether the sum of the addends was more or less than the comparison quantity. In Experiment 2 we replicated this finding in a public kindergarten setting with a group of children from broad socioeconomic backgrounds. In Experiment 3 we compared 5- to 6-year-old children's ability to perform approximate and exact addition problems with the same question format. The children were able to judge accurately whether the sum of the addends was more or less than a comparison quantity when approximate comparisons were involved but not when exact comparisons were required. These studies show that young children from a broad range of backgrounds can solve approximate arithmetic problems before they receive formal arithmetic instruction. Although young children may struggle to perform exact arithmetic, they have remarkable skill with approximate arithmetic. Instruction in school mathematics may be enhanced by building on children's pre-existing knowledge of approximate arithmetic.

Early identification and remediation of children at-risk for reading difficulties in Greek: a comparison of two theory-driven programs
Timothy C. Papadopoulos, University of Cyprus, *Cyprus*
Panayiota Kendeou, Cyprus Pedagogical Institute, *Cyprus*
Giorgos Charalambous, University of Cyprus, *Cyprus*
Rania Hadjicosta, University of Cyprus, *Cyprus*

This study is an on-going longitudinal experiment that compares a cognitive (PREP: PASS Reading Enhancement Program) and a neuropsychological program with strong phonological, naming speed, and meaning components (DEST-RT: DEST Remedial Tool). PREP was designed to improve selected aspects of children's information processing skills with ultimate aim to increase their word reading and decoding abilities (see original work by Das, Mishra, & Pool, 1995). DEST-RT, in turn, was based on a model of literacy development including both writing and reading, and their interaction. Twenty-eight children aged 6.6, matched on the basis of age,

gender, parental education levels, non-verbal and verbal ability, were assigned to two experimental groups (n =14 in each group) and compared before and after a four-week intervention, in Grade 1, on a set of dependent measures including phonological, cognitive (successive and simultaneous processing), rapid automatized naming, word accuracy and fluency, spelling, and passage comprehension tasks. A third group of children (n = 19) also experiencing difficulties with reading did not receive any treatment and was included as a control group (RD-C). All participants had been screened from kindergarten as being at-risk for developing reading difficulties, a finding confirmed a year later, as their word identification and word attack scores were below the 25th percentile compared to norming data. Preliminary results indicated improvement in all measures for all three groups. PREP group, however, performed comparatively better than both the DEST-RT and RD-C, with the most significant difference being observed in pseudoword fluency. Discussion centres on the need for devising remedial schemes that will be both theoretically driven and cost-effective, leading, consequently, to substantial improvements in reading and spelling early interventions.

Learning out of school and the concept of authority
Felicity Wikeley, University of Bath, *United Kingdom*
Kate Bullock, University of Bath, *United Kingdom*
Yolande Muschamp, University of Bath, *United Kingdom*
Tess Ridge, University of Bath, *United Kingdom*

This paper is developed from a wider study of the learning that takes place in out-of-school activities. Here we focus on the educational relationships between adults and young people that happen in what are often perceived as leisure pursuits. Educational relationships tend to be hierarchical in nature (Edwards, 2001) and are fashioned by community and institutional cultures (Osborn et al., 2003) but it is the interactions, both implicit and explicit, between individuals that form the basis of our interest. It is acknowledged that the likelihood of learning is enhanced if it takes place within a 'community of practice' (Lave & Wenger, 1998) but Roth and Lee (2006) argue that classrooms can never be constructed as genuine learning communities as they lack a collective intent or purpose and free choice in terms of engagement and contribution. By exploring with young people, the learning that happens in their out-of-school activities we identified how these activities matched Roth and Lee's criteria in ways that schools cannot. The voluntary nature of not only their own engagement, but also that of the adults, was important to the young people. A more flexible perception of expertise was created as the young people became skilled members of the group and were able to contribute their greater knowledge and understanding of the activity to new members. In many of the activities the young people saw the adults as co-learners. In this paper we use the concept of authority (Wilson and Cowell, 1990; Steutel and Spieker, 2006) to understand and explain the skills young people gain from their engagement in out-of-school activities and suggest how such understanding can be used to better advantage in the classroom.

Text, process and writers' reflections: Comparing writing profiles through case studies
Susan Jones, Exeter University, *United Kingdom*
Debra Myhill, Exeter University, *United Kingdom*

This paper draws on data from an ESRC-funded study investigating the composing processes and strategies employed by secondary aged writers stratified by age, gender and ability. Annotated timelines were created during the observation of children writing in classroom settings. The children were subsequently interviewed using the timelines and their own writing to prompt stimulated recall of their own decision making processes. An initial analysis of the timelines

revealed different writing profiles which could be explored in relation to the age, gender and ability of the children involved. Writing profiles have principally been associated with research in the cognitive psychological tradition (Hayes and Flowers 1980, Van Waes and Schellens 2003) from this perspective the profiles have been used to illuminate process, researchers have not concerned themselves with who might exhibit such profiles, able or weak writers, novelists, journalists or scientists, boys or girls. The context of this study allowed for a tentative enquiry into who exhibits a given profile, in what context and to what end. This paper uses the vehicle of closely drawn case studies to compare children with different writing profiles. The case studies will employ the linguistic analysis of what children wrote while being observed, a presentation of the profile that was revealed through observation, and the child's voice commenting critically on their own texts and reflecting on their own decision making processes. Taken together this data will attempt to draw on three different traditions within writing research: the cognitive, the linguistic and the socio-cultural.

O 1
01 September 2007 08:30 - 10:30
Room: Konferencia
EARLI Invited Symposium

Trends in instructional design for complex learning

Chair: **Sean Early,** University of California, *USA*
Organiser: **Jeroen van Merriënboer,** Open University of the Netherlands, *Netherlands*
Discussant: **Jan Elen,** University of Leuven, *Belgium*

Complex learning aims at the integration of knowledge, skills, and attitudes; the coordination of qualitatively different constituent skills, and the transfer of what is learned to daily life or work settings. New instructional design models are needed to allow for such complex learning. These models stress the integration of knowledge, skills and attitudes through the use of whole, meaningful learning tasks. They aim at integrated learning objectives and help learners to coordinate different aspects of whole tasks by scaffolding their performance. And they aim at transfer of learning by means of mathemagenic instructional methods that stimulate learners to construct general, abstract knowledge. A fundamental rethinking of traditional instructional design is necessary. In this symposium, trends in instructional design for complex learning will be discussed from four highly interrelated perspectives: (1) cognitive foundations, (2) cognitive task analysis, (3) holistic design, and (4) performance assessment. The four contributions to the symposium will be discussed by Jan Elen from the Catholic University of Leuven, Belgium.

Cognitive foundations of complex learning
John Sweller, University of New South Wales, *Australia*

Humans have evolved to deal with two distinct categories of complex learning: biologically primary and biologically secondary (Geary, in press). From an information processing perspective, the most complex knowledge we acquire is biologically primary knowledge that we have evolved to acquire, such as a first language, face recognition or general problem solving. It is acquired unconsciously and without instruction. In contrast, biologically secondary knowledge, while far less information rich, requires direct instruction and conscious effort. This presentation will be concerned with the cognitive load theory principles that govern the acquisition of biologically secondary knowledge.

Cognitive task analysis for complex learning
Richard Clark, University of Southern California, *USA*
Kenneth Yates, University of Southern California, *USA*
Sean Early, University of Southern California, *USA*

Cognitive task analysis (CTA) consists of a variety of interview and observation strategies designed to capture an accurate and complete description of the knowledge experts use to perform complex tasks. Complex tasks are defined as those where performance requires the integrated use of both controlled (conscious, conceptual) and automated (unconscious cognitive strategy) knowledge to handle tasks whose performance often extends over many hours or days. The results of CTA are used as the basis of expert systems, the development of tests to certify job or task competence and as the content of instruction when people must acquire new and complex knowledge in order to achieve a performance goal. This presentation will review past research on

CTA including a meta-analysis of CTA-based training and two studies where CTA data was used to train trauma surgeons.

Holistic design for complex learning
Jeroen van Merriënboer, Open University of the Netherlands, *Netherlands*
Liesbeth Kester, Open University of the Netherlands, *Netherlands*

Traditional instructional design models use an atomistic approach, in which a complex learning domain is analyzed into small parts that are subsequently taught in a sequential fashion. For complex learning, the atomistic approach needs to be replaced by a holistic approach. This presentation will discuss a systematic, holistic approach to the design of complex learning, called the Ten Steps (van Merriënboer & Kirschner, in press). The Ten Steps yield educational programs that are built from four basic components: (1) learning tasks, (2) supportive information, (3) procedural information, and (4) part-task practice. Concrete examples of educational programs and research results concerning their effectiveness will be discussed.

Assessing the Progress of Learning and Mental Model Development for Complex and Ill-structured Learning Tasks
J. Michael Spector, Florida State University, *USA*

Robust assessment methods for well-defined procedural tasks and for declarative knowledge exist. However, there are many challenges with regard to assessing improvements in learning when the tasks to be learned are less well defined. We present a methodology for capturing and assessing relevant cognitive aspects of complex task performance.

O 2
01 September 2007 08:30 - 10:30
Room: -1.62
SIG Invited Symposium

The transmission of social competence in the school and in the peer group; a focus on cultural diver

Chair: **Paul Vedder,** Leiden University, *Netherlands*
Organiser: **Paul Vedder,** Leiden University, *Netherlands*
Discussant: **Åsa Mäkitalo,** Department of Education, Göteborg University, *Sweden*

Throughout Europe educational institutions are increasingly confronted with the question what they can do to support students' development of social competencies. A fear for a reduction of social cohesion in our societies, heightened levels of interethnic tensions, as well as a seemingly low involvement of youth in political activities and community development projects are a background for the pressing nature of this question. How do researchers respond to this question? Do they have a clear notion of instruments measuring social competence and their validity in terms of the feasibility to assess relevant criterion behavior? What is relevant criterion behavior? And are we capable of developing valuable intervention studies to influence social competence or, stated differently, are we capable of identifying valid "conditions – mechanisms – outcome chains?" This symposium is meant to present empirical research that is seeking answers to these questions. Given the multicultural nature of our modern societies the presentations will all explicitly describe and justify the way the studies dealt with cultural diversity issues and how these affected the outcomes.

The impact of a cooperative learning curriculum on pupils' social status development and interethnic bias at multiethnic elementary schools
Michiel Oortwijn, Leiden University, *Netherlands*
Paul Vedder, Leiden University, *Netherlands*

How do pupils in multicultural elementary schools perceive pupils with different ethnic backgrounds? And how is their perception influenced by ethnically heterogeneous grouping? In this study we investigated popularity and perceived cooperativeness in multiethnic pupil teams in elementary schools. First of all, we hypothesized that pupils' popularity and perceived cooperativeness would increase as a function of SCL time. Secondly, we hypothesized that SCL time increases the popularity and level off the difference in perceived cooperativeness between national and immigrant pupils. Finally, many studies have found that interethnic contact reduces interethnic bias because it facilitates the formation of interethnic friendships. We propose in this paper that SCL time not only increases interethnic friendships, but also augments the popularity and perceived cooperativeness within ethnically heterogeneous teams, but not of ethnically homogeneous teams. 94 Pupils (26 teams) from five multiethnic elementary schools participated in a structured cooperative learning (SCL) curriculum. Both teachers and pupils had no prior SCL experience. The curriculum entailed two SCL training lessons, followed by a SCL math curriculum of nine lessons. The results show that SCL time increased both popularity and cooperativeness across ethnic background. In addition, experience with SCL increased the popularity of immigrant pupils and decreased the perceived cooperativeness difference between immigrant pupils and national pupils. Lastly, SCL time only augmented the popularity and

perceived cooperativeness within ethnically heterogeneous teams. This last result shows that enduring interethnic contact facilitates not only interethnic friendships, but also interethnic popularity and perceived cooperativeness.

Multisource assessment of children's social competence; What makes the teacher ratings divergent from others?
Niina Junttila, University of Turku, *Finland*
Marja Vauras, University of Turku, *Finland*

A Multisource Assessment of Social Competence Scale was developed and examined to test the consistency of the self, peers', teachers', and parents´ ratings of Finnish school-aged children's (n = 985) social competence. The correlations between the four social agents were statistically significant, albeit quite low, indicating that the different sources tend to provide divergent pictures of a child's social competence. To study the possible concomitants for these divergences, we compared linguistically and mathematically high-, average- and low-achieving students in regard to self, peer, teacher, and parent ratings. The differences between high- and low-achieving children were all statistically significant indicating, that the low-achievers had less co-operating skills and empathy behaviour and more impulsive and disruptive behaviour than high-achievers. Outstandingly, the effect sizes concerning the differences for teachers´ ratings were especially high. So what makes the differences in teacher ratings so high? School culture and the dominant norms and values defining the correct behaviours are important in the understanding of the social competence in the classrooms. Earlier studies suggest that both rater culture and rated culture specific differences may play a role (see Mpofu, Thomas, & Chan, 2004). The teacher ratings of low-achieving students were particularly low. Could it be that teacher use prejudicial expectations while rating students' social competence? This and other possible cultural and rater-based explanations for the divergences and their effects on students' socio-emotional well-being, learning opportunities and intervention designs are discussed in the presentation.

The influence of teacher- and class characteristics on the development of social behavior of 4-8 year-olds with different socio-economic and ethnic backgrounds.
Simone Doolaard, University of Groningen, *Netherlands*
Roel Bosker, University of Groningen, *Netherlands*

Next to the relationship between classroom characteristics and achievement, there always has been an interest in classroom characteristics and behavior, as the outcome of schooling and as an intermediate variable. Class size is one of these characteristics. Finn e.a. (2003) conclude that students in small classes display less disruptive and more prosocial behavior than do students in large classes. The research also suggests that teachers get to know each student more intimately in small classes and their tolerance for a broader range of student behaviors is increased. They discuss two theoretical perspectives to support why small classes work: 'visibility of the individual' and 'sense of belonging'. Several questions remain on differential effects and mechanisms to explain why small classes affect students' academic and social behavior. To adresses these issues a large scale study has been started in primary education in the Netherlands. In this study three cohorts of students are followed for a period of 3 years (age 4-8, 200 schools). Their behavior was measured once a year, their teachers were questioned and students and teachers were observed during the lessons. Preliminary analyses show that extraversion is negatively correlated to agreeableness and emotional stability. In smaller classes children are rated more extravert and less agreeable and emotional stable. This is in line with other research that indicate that children in smaller groups are more on the 'firing line', they have to be attentive, children are

more willing to approach the teacher and teachers tolerate more noise. On the other hand this could indicate that in larger groups children receive less space and opportunity to act out. Teachers might interpret this as more agreeable and emotionally more stable. Further analyses need to be executed on the development of social behavior from grade 1 to 4 and the differential effects.

Social cohesion in multicultural classrooms: interethnic contact in social networks
Gabriel Horenczyk, Hebrew University, Jerusalem, *Israel*
Janna Fortuin, Leiden University, *Netherlands*
Paul Vedder, Leiden University, *Netherlands*

Although much research in the past decade has concentrated on peer relations, this research has mostly focused on peer relations in the form of (best and/or reciprocated) friendships and sociometric status. Research into the broader form of peer relations, social networks, has been relatively sparse, mainly due to the statistical problems surrounding the analysis of social network data. These social networks seem important to study, because they are the prime setting where socialization can occur and social competence can develop. Presently, new techniques are available, both for network identification and analysis of network data, that can be used to study interesting phenomena such as which factors govern selection of peers for social networks. It is well known that ethnic background is one of the selection factors for friendships during child and adolescent years. The question is whether this selection effect occurs as strongly within social networks. This was explored in a Dutch sample of 8th graders. Ethnic identity played an important role in the selection of peers for social networks. However, a lot of the networks were multi-ethnic in make-up, supporting a view that integration does take place in Dutch schools during peer interactions.

O 3
01 September 2007 08:30 - 10:30
Room: 0.87 Marx
SIG Invited Symposium

Qualitative methods in the exploration of students' knowledge and learning

Chair: **Leo Gürtler,** University of Education Weingarten, *Germany*
Organiser: **Florian C. Haerle,** University of Nevada, Las Vegas, *USA*
Discussant: **Michaela Glaeser-Zikuda,** University of Education Ludwigsburg, *Germany*

Not often is the nature of learning and instruction explored by the means of qualitative research methodologies. This is surprising as qualitative approaches can provide a variety of perspectives on, and in-depth understanding of, student knowledge and learning processes in classroom settings. The aim of this symposium is to compare and contrast four different qualitative methods in the exploration of student knowledge and learning. The first method focuses on software-based concept mapping as an additional interview step to allow for data reduction and member checking with the interviewee at the same time. Second, "intentional analysis" is introduced as a method that aims at descriptions of through what context an object, question or task is interpreted by the student. Third, the study of qualitative differences in student learning is investigated with a "phenomenographic approach". Finally, a method of video analysis is demonstrated that taps into

verbal and gesture production in processes of science learning. All four methods will be discussed from qualitative and quantitative perspectives and will indicate how they can inform our field of learning and instruction.

Intentional analysis of situated practice: The study of meaning making in conceptual change processes
Liza Haglund, Stockholm University, *Sweden*
Asa Larsson, Stockholm University, *Sweden*
Gunilla Petersson, Stockholm University, *Sweden*
Ola Hallden, Stockholm University, *Sweden*

The aim of this paper is to report from a study on conceptual change with regard to the shape of the earth over an extended period. For this purpose, seven children have been studied through three subsequent interviews. The first interview was conducted individually when the children were four years old. A couple of weeks later, six of the children were interviewed in pairs with a globe as a point of reference. A year later, each child was interviewed individually again. In total, seventeen interviews have been analysed. The children came from a Montessori class and had the Earth and the solar system as an ongoing project. Thus, they had got a lot of information about the solar system. The aim of the study is to describe the ways they structure this information. The data were interpreted and analysed using "intentional analysis". A basis is taken in Donald Davidson's theory of meaning, basically the ideas of 'triangulation' and 'the principle of charity'. Such analysis aims at accounting for cognitive functioning as well as situational aspects. The results concern children's meaning making, described as the problems children encounter when engaged in discussions about the Earth. Using triangulation for identifying discourse and cognitive oriented recourses made it possible to model children's meaning making. It was possible to account for situational aspects in terms of how these were conceptualised by the children as well as their cognitive resources in terms of the models they constructed.

The phenomenographic approach to the study of qualitative differences in learning
Ming Fai Pang, The University of Hong Kong, *Hong Kong*
Ference Marton, Gothenburg University, *Sweden*

Our approach to describing qualitative differences in learning focuses very much on differences in meaning, regardless whether these differences are differences within or between individuals. We are thus not primarily interested in differences between individuals, and we do not make any assumptions about the stability or generalizability of the meanings expressed by them. We are simply interested in what different meanings of a certain phenomenon that can be found. So, how do we find these differing meanings? The answers given by the students to our (very) open-ended questions make up the "pool of meaning". At the word level, all the answers are different, but we are looking for answers that differ at the word level, but not in terms of meaning, and which differ from other answers both at the word level and in terms of meaning. We are looking for critical differences between answers. These differences are supposed to be critical in relation to the object of learning (what the students are expected to learn). The object of learning is not defined as clearly in the beginning of the analysis as it is later on. In a way the object of learning gets defined through our efforts to relate different answers to it.

Analysis of verbal and gesture productions in studies on learning processes in science
Andree Tiberghien, Universitity Lyon 2, *France*
Jean-Francois Le Marechal, ENS-Lyon, *France*
David Cross, Universitity Lyon 2, *France*
Layal Malkoun, Universitity Lyon 2, *France*

The presentation will be focused on the methodology of analysis of classroom productions (utterances and gestures of teacher and students). The chosen perspective is the knowledge involved in classroom practices. We consider that the taught knowledge is staged in the classroom by teacher and the students' joint action. Following Grice, we distinguish between conventional (taught knowledge) and understood meanings (students' or teacher's understanding). Here, we propose a methodology to analyse these types of knowledge: taught knowledge and knowledge understood by the students or the teacher at two time scales, the meso scale (about ten minutes) at which ideas are developed in the class, and the micro scale (about seconds), which is the scale of interactions between individuals (teacher and students). The collected data, which this methodology works out, consist of several hours of video recordings of physics and chemistry classrooms at 10th and 12th grades during teaching sequences on a specific part of the official curriculum (in physics and in chemistry). The meso scale analysis is based on a thematic approach. The discursive productions (including gestures) can be divided into units of about ten minutes. The micro scale analysis is based on a decomposition of knowledge into "facets". Processing facets (without recomposing them to get a concept meaning for example) leads the researcher to characterize classroom according to the density and continuity of the taught knowledge. Treatments involving meso and micro levels allow the researcher to compare this taught knowledge to the meanings constructed by the students.

Concept mapping as an additional interview step to allow for data reduction and member checking with participants
Florian C. Haerle, University of Nevada, Las Vegas, *USA*

The focus of this presentation is to introduce concept mapping as second step of the interview process that allows for data reduction and member check with the interviewee simultaneously. Concept mapping software (i.e., IHMC Cmap Tool software) is used as essential part of this method to account for computer based-data collection, which in turn allows for the efficient use of qualitative data analysis software. The data collection entails two steps: (1) During the interview, the interviewer captures and reduces the interviewee's answers in writing. The concept map software is used in this process; for each (smallest) semantic unit of an answer a digital card is created (concept) which contains the written reduction of the semantic unit. (2) The digital cards are connected with links and links are provided with thematic labels. It is the interviewee who is making the decision which cards should be linked with each other and which theme should be used as label. This linking and labeling process is used to member check (validate) with the interviewee the reduction of his/her answers (content of the digital cards) and to make corrections if necessary. The graphic files of the created concept maps can be later uploaded into software programs for the analysis of qualitative data (e.g., ATLAS.ti). This method was successfully used in two interview studies with fourth and sixth graders exploring their personal epistemology (i.e., conceptions about knowledge and knowing). 140 concept maps were generated following this method of data reduction and member checking. The methodologically comparison with traditional interview methods revealed that the presented methods is more accurate in the reduction process and outcome of interview data. My presentation will entail a demonstration of this new method as it

was used in these two studies and the methodological comparison with traditional interview methods and analysis.

O 4
01 September 2007 08:30 - 10:30
Room: -1.64
SIG Invited Symposium

Engaging learners in the processes of assessment

Chair: **Jim Ridgway,** Durham University, *United Kingdom*
Organiser: **Jim Ridgway,** Durham University, *United Kingdom*
Discussant: **Denise M. Whitelock,** Open University, *United Kingdom*

Situative alignment of formative and summative assessment functions to maximize engagement and learning
Daniel T Hickey, Indiana University, *USA*
Steven J Zuiker, Indiana University, *USA*
Kate Anderson, Indiana University, *USA*

Recent reviews have highlighted the well-established potential of formative feedback on classroom assessments as a means of improving teaching and learning. A key conclusion is that feedback must be both useful and used in order to realize its formative potential. We contend that all participants in educational systems (including students, teachers, and administrators) must engage with the whole range of assessment measures and data through formative assessment practices in order to realize and, moreover, maximize the formative potential of assessment. To this end, feedback must be appropriately useful and used not only for different participants in an educational system but across these participants as well. This presentation will summarize a program of research to coordinate student engagement in order maximize the formative potential of classroom assessment and external testing. This program of research is distinctive because it employs contemporary situative views of knowing and learning to accomplish widely held formative goals for assessment and testing. Our presentation will first summarize relevant aspects of situative theories and then describe specific assessment innovations emerging from this view before detailing our broader multi-level/multi-method approach. Our framework employs three levels of increasingly formal assessment (close-level quizzes, proximal-level exams, and distal-level tests). In order to maximize engagement, formative and summative functions are aligned within and across levels, and refined across three increasingly formal cycles of design-based research (implementation, experimentation, and evaluation). Data and examples from three separate studies of innovative science curricula are presented to illustrate how this approach can maximize collective discourse, individual understanding, and aggregated achievement, while also providing rigorous evidence of those improvements. We will also present the latest results from ongoing study of elementary mathematics that is attempting to document the long-term consequences of this approach when applied to the entire fifth-grade mathematics curriculum across four elementary schools.

Teachers' and students' perceptions of assessments: Are they able to accurately estimate the difficulty levels of assessment items?
Gerard van de Watering, Technische Universiteit Eindhoven, *Netherlands*
Janine van der Rijt, Maastricht University, *Netherlands*
Filip Dochy, Katholieke Universiteit Leuven, *Belgium*
David Gijbels, University of Antwerp, *Belgium*

In today's higher education, high quality assessments play an important role. Little is known, however, about the degree to which assessments are correctly aimed at the students' levels of competence in relation to the defined learning goals. This contribution reviews previous research into teachers' and students' perceptions of item difficulty. It focuses on the item difficulty of assessments and students' and teachers' abilities to estimate item difficulty correctly. The review indicates that teachers tend to overestimate the difficulty of easy items and underestimate the difficulty of difficult items. Students seem to be better estimators of item difficulty. The accuracy of the estimates can be improved by: the information the estimators or teachers have about the target group and their earlier assessment results; defining the target group before the estimation process; by the possibility of having discussions about the defined target group students and their corresponding standards during the estimation process; and by the amount of training in item construction and estimating. In the subsequent study, the ability and accuracy of teachers and students to estimate the difficulty levels of assessment items was examined. In higher education, results show that teachers are able to estimate the difficulty levels correctly for only a small proportion of the assessment items. They overestimate the difficulty level of most of the assessment items. Students, on the other hand, underestimate their own performances. In addition, the relationships between the students' perceptions of the difficulty levels of the assessment items and their performances on the assessments were investigated. Results provide evidence that the students who performed best on the assessments underestimated their performances the most. Several explanations are discussed and suggestions for additional research are offered.

Engaging learners in assessment via the use of blogs
Kan-Kan Chan, University of Macau, *Macau*
Jim Ridgway, Durham University, *United Kingdom*

This paper presents the results of a qualitative exploration of student teachers' practices using online web logs (blogs) to support the process of self assessment. Nineteen students on a teacher education program in Macau participated in the study for two semesters. The concept of assessment for learning emphasizes constructive feedback and explicit assessment criteria; this was implemented in two technology courses. A systematic content analysis of students' journals and portfolios reveals students applying a variety of assessment criteria to judge their learning, including: completion of class exercises; the time taken; their ability to work independently; and their ability to follow in class. Students were found to value the feedback provided by the tutor and their peers. They identified enhanced motivation, and social support, as useful components of the feedback, as well as the more obvious cognitive aspects. Findings suggest that the availability of blogs can facilitate students in the process of assessment for some, but not for all, students. Blogs can function well as a platform, but more work needs to be done to establish the circumstances under which they can be used effectively, to the benefit of all students.

Embedded assessment in sciences: Encouraging thinking skills and metacognition
Judy Dori, Technion, Haifa, *Israel*
Tali Tal, Technion, Haifa, *Israel*

There is a consensus that the development of thinking skills and metacognition should be a major constituent of teaching toward scientific literacy. Furthermore, we believe that merely teaching thinking skills is not enough and it should take part in the wider framework of enhancing thinking culture in the classroom along with embedded assessment. In this study we investigated the (1) culture of variety of science classes, in which embedded assessment was employed, and (2) effect of embedded assessment on students' higher order thinking skills. By embedded assessment, we mean employing diversified assessment modes and their integration throughout the learning process. We studied four groups of secondary school students: chemistry majors (grades 11-12), two groups of non-science majors (grades 10-11), and a group of gifted students in a pull-out enrichment program (grades 7-9). All the groups were engaged in science courses that focused on the idea that learners should be active in the process of learning and knowledge construction. Data collection included pre- and post open-ended questionnaires with variety of tasks along with interviews. Our findings indicated differences among groups with regard to employing thinking culture, ranging from more teacher-centered traditional teaching to employing mainly open discussions and inquiry that require constant thinking and reasoning. In examining the different skills for each group we found that posing questions, argumentation, reflection, value judgment, graphing, and metacognition – were improved for all the groups with some variation in net gain and significance. In classes where the learning materials and the tasks were situated in more student-centered environments we successfully achieved our goals. However, in traditional teacher-centered environments only sometimes students participated in a socioscientific discourse. Our assumption that attainment of thinking and assessment culture is affected by the lack of substantial change in teachers' beliefs and practice, needs further investigation.

O 5
01 September 2007 08:30 - 10:30
Room: 4.95
Symposium

Blended learning in higher education: theory and praxis

Chair: **Guus Wijngaards,** INHOLLAND University, *Netherlands*
Organiser: **Thomas Sporer,** University of Augsburg, *Germany*
Organiser: **Janet MacDonald,** Open University in Scotland, *United Kingdom*
Organiser: **Roisin Donnelly,** DIT Learning and teaching Centre, *Ireland*
Organiser: **Jos Fransen,** Centre for eLearning INHOLLAND University, *Netherlands*
Organiser: **Guus Wijngaards,** Centre for eLearning INHOLLAND University, *Netherlands*
Discussant: **Robert McCormick,** Open University, *United Kingdom*

Recent studies are showing that 'blended learning' is more than a mix between face-to-face and online education. Blended learning seems to include mixtures between eLearning and other ways of learning, where the right choices have to be made in the distribution of learning content, didactical approaches, ways of communicating and characteristics of learning environments, in the perspective of the type of learning process and characteristics of students. This symposium

provides evidence from qualitative studies of blended learning in practical situations, drawing on tutors' and students' perspectives, contrasted with theoretical ideas. Attention is focused on assessment in blended learning environments and the use of ePortfolios to align learning, teaching and assessment within new educational approaches, as well as on roles and effectiveness of eTutors in blended learning, focussing on academic learning and social integration. Attention is focussed also on blended strategies in problem-based learning by presenting recent case study research, and on the redesign of an initial teacher training curriculum, offering different routes to students according to their need of flexibility and support. Finally, a framework is offered for determining the quality of reflection reports in a blended learning environment. The discussant will go into issues like the design, deliverance, support and evaluation of the presented projects, the degree of internal locus of control for the learners, the assessment methods and tutor and student perceptions on interactions. 1. E-Portfolios; A Blended Assessment Strategy between Bologna and Web 2.0 (Gabi Reinmann/Thomas Sporer) 2. Evolving Tutor Roles for a Changing Environment; Blended Learning in Practice. (Janet Macdonald) 3. Blended Problem-based Learning (Roisin Donnelly) 4. New Blends in Education; Blended Learning & Teaching and the Initial Teacher Training Curriculum (Jos Fransen) 5. Determining the Quality of Reflection Reports in Blended Learning Environment, A New Frame of Reference (Eric Poldner)

E-Portfolios; A Blended Assessment Strategy between Bologna and Web 2.0
Gabi Reinmann, Medienpädagogik University of Augsburg, *Germany*
Thomas Sporer, Medienpädagogik University of Augsburg, *Germany*

Our proposal addresses to major trends in technology-enhanced education today: the rise of the next generation of educational technologies called Web 2.0 and the support of the Bologna Process via e-learning. Both trends are important issues for the theory and practice of learning in higher education, especially with regards to assessment strategies. The research focuses on self-organized and informal learning in context of Web 2.0 in contrast with the need for a common assessment framework for formal learning settings in context of the Bologna Process. We analyse how these issues interact with each other and show how a blended assessment strategy based on e-portfolios could be a means to integrate the promises of self-organized learning through social software with the necessity of establishing quality standards in the European Higher Education Area.

Evolving tutor roles for a changing environment; blended learning in practice
Janet MacDonald, Open University in Scotland, *United Kingdom*

Interest in the role of the tutor has been widespread in UK Higher Education, fuelled by the demands of a mass higher education system and an increasingly diverse student body with a broader range of needs. For students who are off campus much of this tutor support is mediated by distance technologies, and arguably forms part of a blended strategy. However, it is not always clear what aspects of the tutor role might be particularly effective in leading to better student learning or integration, or meeting a diversity of needs. A rapidly changing environment at the Open University (UK) has led to a rich diversity of approaches using a variety of technologies, illustrating well the pragmatic aspects of blended learning. But which of these interactions are really effective in supporting student learning, and what does it mean to be a good tutor? This paper will describe findings from a qualitative study of tutor-student interactions at the Open University (UK), drawing on tutors' and students' perspectives.

Blended problem-based learning
Roisin Donnelly, DIT Learning and Teaching Centre, *Ireland*

Blended learning in the context of this study consists of a blend of at least two pedagogical approaches: the integration of face-to-face problem-based learning in a tutorial setting with a variety of eLearning technologies. The concept of blended problem-based learning is introduced here through an outline of recent case study research on a Postgraduate Diploma Module entitled 'Designing E-Learning' for academic staff in Higher Education in the Republic of Ireland. In recent educational research, there has been an obvious shift towards more social, collaborative and communal perspectives of learning. Various forms of collaborative and inquiry-based learning include the idea that learning should be understood as a combination of participation, knowledge creation and internal processes. Problem-based learning (PBL) is one form of inquiry-based learning that is a holistic approach to education inclusive of the learning environment, design of curricula, student support and facilitation of learning. Problem-based learning and eLearning are pedagogical approaches that each support a constructivist theory of learning, and social interaction plays a fundamental role in the development of cognition among participants; there is a group-oriented, knowledge-building discourse throughout the module, and the participants work collaboratively in real-time and asynchronously to manage the problem. Interaction is a critical component because learning occurs in a social context through collaboration, negotiation, debate, and peer review. Although using e-learning in conjunction with PBL has a number of advantages, there are also a number of difficulties to be overcome. This paper reports on each of these and discusses how this module challenged some of the rhetoric about both PBL and eLearning.

New blends in education; blended learning & teaching and the initial teacher training curriculum
Jos Fransen, Centre for eLearning INHOLLAND University, *Netherlands*

The School of Education of INHOLLANDUniversity for Professional Education started in 2005 with the project 'New Blends in Education', to develop three learning routes that meet the demands of students and society for flexible learning arrangements. Those routes are positioned in a continuum, extending from maximum teacher-directed synchronous learning to maximum student-directed asynchronous learning. The project involved the development of a theoretical framework on blended learning and the design of learning practices, followed by four experiments on innovative design of practices within the initial teacher training curriculum. Research on process and results of those experiments offered new insights leading to the design of new experiments on a larger scale in the second year, resulting in the recommendations for the redesign of the initial teacher training curriculum.

Determining the quality of reflection reports in a blended learning environment; a new frame of reference
Eric Poldner, Centre for eLearning INHOLLAND University, *Netherlands*

Reflection is crucial to enhance deep learning within the context of competence-based education and peer feedback and ICT-tools could be valuable instruments for improving the quality of reflection of the students and tutors. Research on the quality of reflection using peer feedback and streaming video in an electronic learning environment in a digital initial teacher training program will probably offer insight in the quality and level of reflection using those new tools. The research also resulted in a reflective framework for determining the quality of reflection reports. First results of quality improvement using peer feedback and streaming video in a blended learning environment will be presented.

O 6
01 September 2007 08:30 - 10:30
Room: 2.54 Novobátzky
Symposium

Academic regulation and identity: Sociocultural perspectives and research

Chair: **Erica Sainsbury,** University of Sydney, *Australia*
Organiser: **Richard Walker,** University of Sydney, *Australia*
Discussant: **Julianne Turner,** University of Notre Dame, *USA*

While self-regulation has mostly been theorised and researched from a social cognitive perspective, self-regulation researchers have recently given greater consideration to the sociocultural context (Perry, Turner & Meyer, 2006) of their research. Concurrently, self-regulation researchers have begun to consider the relationship between self-regulation and the learner's sense of identity (Paris, Byrnes & Paris, 2001). There is, however, little empirical research into self-regulation from an explicitly sociocultural perspective and no research into the relationship between self-regulation and learner identity. This symposium aims to redress this situation. The symposium consists of five papers which deal with self-regulation and identity to different degrees and from different sociocultural theoretical perspectives. A theoretical paper focuses on sociocultural issues concerning self-regulation and identity and draws comparisons with other motivational approaches. Three empirical papers examine the relationship between self-regulation and identity primarily from a sociocultural psychological perspective, while the other empirical paper draws on both sociocultural psychological and sociocultural discourse perspectives. The symposium is theoretically and educationally significant because it presents theory and research on this important issue.

Sociocultural perspectives on academic regulation and identity: Theoretical issues
Richard Walker, University of Sydney, *Australia*

While self-regulation has mostly been theorised and researched from a social cognitive perspective, self-regulation researchers have recently given greater consideration to the sociocultural context (Perry, Turner & Meyer, 2006) of their research. Concurrently, self-regulation researchers have begun to give some consideration to the relationship between self-regulation and the learner's sense of identity (Paris, Byrnes & Paris, 2001). They have speculated that student self-regulated behaviour is motivated by the desire to be recognised according to specific identities such as "a good student." From a different theoretical perspective, Ryan & Deci (2003) have suggested that individuals acquire identities which, once adopted, play a significant role in their self-regulatory activities. In recent years self-regulation has been considered from an explicitly sociocultural perspective (Hickey & McCaslin, 2001) but the theoretical analysis has been limited in scope. Identity formation has also received limited theorisation by sociocultural psychologists (Penuel & Wertsch, 1995: Vadeboncoeur & Portes, 2002) but has been the subject of more extensive work by sociocultural discourse theorists (eg Gee & Green 1998). This paper aims to examine and analyse, from a sociocultural perspective, theoretical issues of relevance to both self-regulation and identity formation, as well as to the interrelationship between them. The theoretical analysis offered in the paper thus provides a framework for the issues raised by the

empirical studies which follow in the symposium and at the same time provides, to some extent at least, a point of comparison with socio-cognitive and other motivational approaches.

The role of co-regulation in enhancing self-regulated learning and academic outcomes: A sociocultural study
Lynette Arnold, University of South Australia, *Australia*
Richard Walker, University of Sydney, *Australia*

This paper reports an intervention, grounded in sociocultural theory that enhanced Year 5 students' academic regulatory processes and achievement outcomes within naturalistic classroom settings. The intervention consisted of two parts: first a series of teacher workshops exploring opportunities to enhance student regulatory processes, and second the teacher implementation of a collaborative researcher-teacher program that scaffolded students' metacognitive and cognitive behaviour. A sample of 135 Year 5 students in five classes across two schools participated in the study. The focus of investigation was classroom interaction and student engagement in classroom curriculum activities promoting teacher scaffolding and co-regulation that enhanced self-regulation (McCaslin, 2004). Prior to the intervention, classroom observations were conducted to identify the contextual and sociocultural influences on students' academic regulatory processes. A series of student survey and assessment data was also collected to establish students' metacognitive knowledge monitoring ability, perceived competence and achievement. Teachers in one school then implemented the intervention program. Further data was collected during and after the intervention. Specifically, the complementary results of hierarchical linear modelling (HLM), classroom discourse mapping and case study analyses will be discussed. Particular attention will be given to how high-, medium- and low- achieving students identified themselves as learners, and the ways in which the contextually relevant, socially situated opportunities provided as a result of the intervention promoted positive changes in identity and perceptions of self that led to improved self-regulated learning and achievement outcomes for intervention students.

Self-regulation and transfer in a problem based learning medical program
Sarah Hyde, University of Sydney, *Australia*
Richard Walker, University of Sydney, *Australia*

This longitudinal study applies a socio-cultural approach to the investigation of how medical students regulated and transferred their learning in problem-based learning (PBL) tutorials and the hospital ward. A socio-cultural perspective explains self-regulation as arising through interaction with others and transformation of ones participation through joint activity. Transfer is also dependent upon participation in activities and activity structures. A socio-cultural approach conceives transfer as the changing relations between persons and context, with the socio-cultural activity mediating that change and development (Beach, 1999). This changing relation results in a different sense of self and social positioning, depending upon an individuals desired or actual role within a specific context. A person can establish similar meaningful relationships with two different contexts, depending on goals and identity, thus facilitating transfer (Beach, 1999). If a meaningful relationship fails to develop, or there is a mismatch between desired and actual role however, resistance to regulation and transfer may occur, as will be illustrated. Video recorded non-participant observation and individual interviews with second and third year medical students were used to assess self-regulation and transfer over a two year period. This information was triangulated with student journals, portfolios, and survey data. The results show that students' transfer and self-regulation are influenced by their perceived role within each context, as well as the perceived usefulness of the learning task to reach their goals. Educators must be aware of the

effect an individuals' perceived role within the social structure of the context has on participation and mediate the socio-cultural activity accordingly to afford the likelihood that students will become legitimate members of the community to which they aspire to belong.

Enhancing srl in a tertiary level module: the role of instructional discourse and cultural models about learner identities

Stefanie Chye, Republic Polytechnic, *Singapore*
Richard Walker, University of Sydney, *Australia*

The capacity for SRL is presently recognized as a necessary and inherent goal of continual lifelong education. This makes SRL development an educational imperative. Beyond the general recognition that SRL can and should be explicitly taught, how formal SRL instruction should best be implemented is less clear. This study attempts to shed light on the issue by examining how SRL development may be supported or constrained in a tertiary level, pre-service teacher education SRL instructional module, as it occurred. It is assumed that an understanding of these processes would contribute to an improvement in pedagogical practices. To achieve these aims, a sociocultural perspective is employed as the overarching theoretical framework. In line with the sociocultural orientation, the study focuses specifically on the monologic and dialogic forms of instructional discourse employed and the cultural models about SRL that are produced. An interpretive analysis of how the cultural models about learner identities constructed during SRL instruction may act to facilitate or assuage the development of self-regulation is offered. This discussion draws upon postmodern and sociocultural accounts of identity and power and considers them in relation to SRL development and the goals of SRL instruction. Overall, the findings suggest that the cultural models about learner identities constructed through monologic and dialogic SRL instruction can both act to support and undermine SRL development. While the monologic stance may be necessary, it is insufficient to bring about SRL development. Dialogic SRL instruction presents its own difficulties. But it appears to be more in keeping with the goals of SRL instruction and self-regulatory processes. This suggests that dialogic SRL instruction may need to be accorded a more central role.

A sociocultural view of self-regulatory reflective practice in teacher education: Resistance and dis-identification

Michael Middleton, University of New Hampshire, *USA*
Eleanor Abrams, University of New Hampshire, *USA*
Jayson Seaman, University of New Hampshire, *USA*

Many teacher education programs emphasize self-reflective practice; however, teacher educators often wonder why some teaching interns participate in self-reflective practice whereas others do not. Self-reflective practice can be viewed from a social cognitive perspective as a form of self-regulation, but these perspectives have been criticized for making a dichotomy between the learner and the context. This study uses the sociocultural concepts of dis-identification and resistance to help understand new teachers' engagement in self-reflective practice. Case studies of two student teaching interns were created using interviews, classroom observations, and journal entries. Those case studies were analyzed from the perspectives of resistance and dis-identification to understand the experiences of the two novice teachers who showed very different engagement in self-reflective practice. In the final paper, the two case studies will be presented with elaborated evidence of resistance and dis-identification. Implications for theories of motivation and self-regulation and for teacher education programs are discussed.

O 7
01 September 2007 08:30 - 10:30
Room: 7.14
Symposium

The importance of learning and assessment of competences in higher education

Chair: **Edith Braun,** Freie Universität Berlin, *Germany*
Chair: **Liesbeth Baartman,** Utrecht University, *Netherlands*
Organiser: **Edith Braun,** Freie Universität Berlin, *Germany*
Organiser: **Liesbeth Baartman,** Utrecht University, *Netherlands*
Discussant: **David Gijbels,** University of Antwerp, *Belgium*

Social scientists as well as governments throughout Europe indicate the development of competences within education as an explicit goal of current educational reforms. The Bologna process, a political association of 45 European countries, intents to make education more vocationally oriented by stimulating the development of competences (Rychen & Salgynik, 2001). Social scientists are investigating how teaching and assessment can improve the acquisition of competences. For example, Gijbels (2005) studied the variables that encourage a "deep-face learning strategy" to use knowledge to solve authentic problems. Many researchers (e.g. Birenbaum et al., 2006) emphasise the importance of using adequate assessment methods to enhance the acquisition of competences, and employers expect general key competences of graduates (Teichler, 2003). This symposium focuses on improving the learning and assessment of competences in higher education. Competences can be seen as vocational skills and higher education is supposed to be partly a "vocational training". In this symposium, the concept of competence is looked at from different countries' perspectives. Each paper discusses its definition of competence and the rationale behind this. In addition, the symposium brings together a number of examples of where and how competences are acquired and assessed. Schaeper conducted an empirical study on which factors of the educational environment influence the development of key competences. Braun analysed the longitudinal correlation between competences acquired at the university and later occupational success. Woodley and Little add the importance of work experience as an important influence on the level of competences. The assessment of competences is investigated by Baartman and Jonsson. Baartman investigated if current assessment practices in vocational institutes can be characterised as being competence-based. Finally, Jonsson takes an example of a competence assessment and investigates whether this kind of assessment can be summatively used in higher education to assess and stimulate competence acquisition.

Development of competences and teaching-learning arrangements in higher education
Hildegard Schaeper, HIS Higher Education Information System, *Germany*

In the past decades the German higher education system experienced a shift from teaching to learning, the introduction of new steering mechanisms and the application of performance-based models for the financing of universities and their departments. Correspondingly, the interest in learning outcomes increased while at the same time the significance of input parameters decreased. Responding to the growing concern for learning outcomes, the German graduates surveys, since 1989 conducted by the Higher Education Information System (HIS), pay special attention to the issue of competences and, in particular, to the question of key competences. By means of a self-

assessment instrument we measured the level of competences possessed at time of graduation and the degree of competences that higher education graduates need to perform their professional tasks. Our paper will address the issue of factors influencing the level of key competences possessed at time of graduation and, especially, the role of the learning environment. The research question will be examined empirically using data of a survey among higher education graduates who passed their final examination in 2005.

Competences and vocational success
Edith Braun, Freie Universität Berlin, *Germany*

The Bologna Process aims for more vocational orientated learning in higher education. As a consequence, students are supposed to develop competences, which are useful for their later work. The idea is that competences gained within higher education are important for students' later occupational careers. The empirical question is: are competences predictive for later vocational success? This study used a longitudinal sample to address this question. In the year 2000, 215 graduates were asked to estimate their own competence level at the end of their study programmes. In 2005 the same graduates were asked about their occupational success, operationalised by how much money they earn and how satisfied they are in their current job. In a cross lagged panel design the vocational success was predicted by competences (Chi square /df = 1.92, RMSEA = .07), but not always in the intended direction. Finally, the results of this study and the used constructs of competences and vocational success will be discussed.

Work experience in higher education and its effects on competences and occupational outcomes
Alan Woodley, The Open University, *United Kingdom*
Brenda Little, The Open University, *United Kingdom*
Lore Arthur, The Open University, *United Kingdom*

Employers in the United Kingdom have long complained that the graduates they take on do not possess the basic skills and competences that are required for their jobs. The list of deficiencies varies across employers and industries, but ranges from basic grammar to general communications skills, from applied knowledge to entrepreneurial skills. One approach to remedy these deficiencies has been to include a period of work experience within the student's degree course. In our paper we will examine whether work experience has a positive effect on a graduate's development and on their subsequent career. We will use data from the REFLEX project which is a follow-up study of graduates in several European countries.

Assessment in competence-based education: current characteristics and quality of assessment in dutch vocational institutions
Liesbeth Baartman, Utrecht University, *Netherlands*
Theo Bastiaens, FernUniversität Hagen, *Germany*
Paul Kirschner, Utrecht University, *Netherlands*
Cees Van der Vleuten, Maastricht University, *Netherlands*
Frans Prins, Utrecht University, *Netherlands*

Dutch vocational institutions are legally required to adopt competence-based curricula from 2007 on. They need adequate methods to assess competence, but are struggling between the classical accreditation standards used to evaluate assessment quality, and the need to innovate. This study determines the state-of-the-art of competence assessment methods, by looking at current assessment characteristics and quality, based on a theoretical framework for assessment in

competence-based education. A questionnaire was sent to 38 department managers and 80 teachers of vocational institutions. Results show most institutions still use classical standards and assessment methods, and teachers are concerned about the feasibility of new assessments. The classical standards used seem to hinder the development of adequate assessment methods to determine competence acquisition.

Estimating the quality of new modes of assessment: The case of an "interactive examination" for teacher competence
Anders Jonsson, Malmo University, *Sweden*
Liesbeth Baartman, Utrecht University, *Netherlands*

Profession-directed education aims for students to become competent professionals and there is a need for assessments that can determine the acquisition of this competency. Still, the use of alternative assessments for high-stakes is problematic, for example in terms of marker consistency and construct representation. This article investigates, through a case study of an existing competency assessment methodology, possibilities of a systems approach to assessment. By estimating the quality of an assessment methodology with a comprehensive framework of quality criteria for competency assessments, strengths and weaknesses in the assessment programme can be revealed. In this way the inclusion of complex, performance-based assessment in higher education could be aided, as the systems approach can reveal how to remedy weak spots or allocate resources within the programme.

O 8
01 September 2007 08:30 - 10:30
Room: 0.89 Jedlik
Symposium IN MEMORIAM PETER KNIGHT

Research advances in professional formation: enhancing the quality of teaching and learning in HE

Chair: **Jeff Jawitz,** University of Cape Town, *South Africa*
Organiser: **Peter Knight**, The Open University, *United Kingdom*
Discussant: **Denis Berthiaume,** University of Lausanne, *Switzerland*

There is international commitment to improving the quality of teaching, learning, assessment and curriculum in higher education. Strikingly, some approaches seem to be guided by common-sense rather than research evidence. There have been studies of particular interventions to improve teaching performance but they have not been informed by research evidence about professional formation, which is a surprising omission, especially given research in other professional fields, where it is recognised that training is far from sufficient for development (Becher, 1999; Mintzberg 2004; Cheetham and Chivers, 2005). This symposium proposes that teaching quality enhancement demands attention to formation or Ausbildung, rather than to training; it appreciates the extent to which professional learning is non-formal; it is sensitive to the contextedness of learning; it recognises the socio-cultural conditions of learning; and it is aware of the range of modern thinking about innovation processes (Atkins, 2006). This fresh thinking is elaborated and tested through contemporary data from five countries. In reporting their empirical research and other scholarly enquiries, contributors demonstrate the limitations of established educational

development practices (see also Kember, 2000, Knapper, 2003, Prebble et al., 2004; Atkins, 2006) and reflect complementary research directions (Kreber, 2006; Naidoo, 2006). They explore the ways in which workplace environments, particularly when represented as activity systems, favour certain formations and consider implications for the professional development that is necessary for enhanced teaching and learning quality. There are significant implications here for the organisation and functioning of universities, colleges and regulatory agencies.

Formal and non-formal professional learning: three studies of university teachers
Peter Knight, The Open University, *United Kingdom*

This paper reports on quantitative and qualitative investigations, involving nearly 3000 UK higher education teachers between 2004 and 2006. The three main studies were: 1. Part-time teachers in the Open University: 2401 respondents plus 229 respondents from full-time staff teaching and otherwise supporting student learning. 2. Professionals into teaching: 32 informants from nursing & allied professions and from construction & allied professions. 3. The effects of postgraduate certificates study (the EPGC study): 238 informants from 12 UK universities. Consistent with research into formation in other professions, data support a view of professional formation as a non-formal social processes centred on activity in the workplace. They describe formation processes, practices, affordances, barriers, motivation and frustrations. The EPGC study illuminates the place of formal learning processes. Two main conclusions are: 1. There are things here that can be supported by formal educational provision but equally the quality of the workplace environment as a whole is central to the quality of professional learning. From a concern with the design of courses, this view of formation moves to a concern for job and workplace design. 2. While professional knowledge may, to some degree, be located in individuals it is also located in teams and systems – it is distributed and not concentrated. Nor is it 'a "thing", or a system, but an ephemeral, active process of relating … [and] we go beyond managing knowledge as a thing to also managing knowledge as a flow. To do this we will need to focus more on context and narrative, than on content'. (Snowden, 2002: 3, 5). This challenges taken-for-granted assumptions and implies radical re-vision of arrangements for professional formation that are based on the taken-for-granted views, which are no longer tenable – or no longer tenable without robust, research-informed defence.

Learning in the academic workplace: newcomers and assessment practice
Jeff Jawitz, University of Cape Town, *South Africa*

The conventional view that academics learn through informal learning in the workplace implies that such learning happens by chance and is unstructured. In this paper I report on a study into how new academics learn to judge student performance in complex assessment tasks. The study was conducted at a research intensive historically white university in South Africa. Three case studies were undertaken in academic departments that reflect varying relationships between teaching, research and the profession. Using the work of Bourdieu and Lave and Wenger, I analysed how assessment practice formed part of the communities of practice that constituted the fields associated with these academic disciplines. Drawing on interviews with academics across all three departments, I explored how new academics engaged with the assessment practices in their departments and developed their confidence to judge student performance of complex assessment tasks. In each of the case studies, it was possible to identify a paradigmatic learning trajectory, which, in some cases more than others, provided a structured "learning curriculum" (Wenger, 1998) for new academic staff. Learning to judge student performance happened through participation in a series of assessment practices along this trajectory. The path of the learning

trajectory was found to be determined by the particular configuration of communities of practice within each field. However the existence of these paradigmatic learning trajectories did not mean that learning was unproblematic as they appeared to support the dominant relationships of power within each field and posed particular challenges for those individuals who embarked on alternative trajectories. These findings point to the need for academic staff development practitioners to help identify and make explicit the range of learning trajectories available within particular disciplinary fields, to work with the opportunities offered by these trajectories and to address the obstacles and challenges that they pose for new academics.

Monitoring professional development of junior teachers in Swiss higher education
Nicole Rege Colet, University of Geneva, *Switzerland*

The University of Geneva, like many other research-led universities, is constantly endorsing the idea that quality of teaching and learning in universities must be supported. Although the debate has been going on for almost 15 years, there is no University policy that sustains professional development for teachers. The only milestone in the landscape has been the creation of faculty development centres in all Swiss universities who are now offering a wide range of activities that encompass the traditional teacher training programmes, counselling and evaluation of teaching effectiveness. None of these activities are compulsory and most centres are focussing their efforts on junior teachers and lecturers. This presentation will discuss findings from a research carried out at the University of Geneva on how teaching staff develop their professional expertise. The interview-based research compares professional pathways and conceptions of teachers who either invested time in teacher training programmes (individual workshops or a modular programme) or devoted time to personal counselling. The purpose of the research was to understand how expertise is built in an environment that does little towards acknowledging teaching and rewarding good teaching. It also seeks to discuss the advantages of training programmes versus individual counselling as a means of supporting professional development. Similar researches, for instance Knight, Tait & Yorke, 2006, suggest that counselling might be more effective for professional development than training programmes. The latter do have their virtues but tend to reproduce models of teaching that are centred on content rather than competencies. Counselling is more consistent with learning theories that relate to professional development because learning is contextualised. The findings suggest that professional development should equally favour training as a mean of introducing new thinking and personal coaching in order to promote sense-making and bring to the surface the non-formal learning that has taken place.

Formation for changing conceptions of teaching and learning
Alenoush Saroyan, McGill University, *Canada*

With changing demographics of university students, ever-decreasing resources, and different kinds of competencies required of graduates, now more than ever faculty need professional formation in teaching and pedagogy to meet stakeholder expectations and demands for quality education. Central to research into teaching and teaching improvement is the assumption that conceptions of teaching and learning both underlie and motivate classroom actions. Based on their critical review of the literature on conceptions of academics, Kane, Sandretto, & Heath (2002) highlight the distinction between "simplistic" (primarily focused on the teacher) and "complex" conceptions (multi-dimensional and sophisticated, and directed mostly on the learner, the learning process, and the teacher as the mediating factor of learning). Two studies were carried out to determine the effectiveness of a formal program on university course design and teaching in changing conceptions of teaching and learning and to map out the trajectory of change in conceptions. Study

participants were 100 advanced doctoral students and 100 university professors. Both groups took part in a training program designed to achieve this shift in conceptions. Data were obtained from pre- and post intervention questionnaires. Results reveal 3 distinctly different conceptions of teaching and 5 conceptions of learning and a positive shift in conceptions in both groups following the intervention: There was a decreased emphasis placed on the teacher as transmitter of knowledge and increased emphasis placed on the teacher as the designer of the learning environment and mediator of the learning process. There was a difference between the two groups in the way in which they defined the role of the teacher and student in the teaching and learning process. Study results have direct application in the systematic planning and delivery of teaching development interventions to faculty at the outset of their academic careers.

Longitudinal archiving
Helen Sword, University of Auckland, *New Zealand*

This presentation reports on a research study that is still in its early stages and reflects on the methodological principles involved. Rather than directly addressing the debate about the relative contributions of formal and non-formal formation processes, it asks how the long-term effects of such processes might be identified and analysed. The University of Auckland in New Zealand has only recently joined the ranks of international research universities that offer their academic staff a formal qualification in higher education teaching. Launched in 2006, the Post-Graduate Certificate in Academic Practice ensures that University of Auckland staff, particularly early-career lecturers, can acquire the tools to become successful teachers, research scholars and citizens of the academy. Through an emphasis on "academic practice" writ large, the PGCertAcadPrac addresses the particular challenges faced by academics who must balance the competing demands of teaching, research and service. How do we evaluate the effectiveness of such a programme? Do we monitor self-defined shifts in the participants' thinking? Changes to their behaviour? Improvements to their students' exam results? Declarations of personal well-being? Future career trajectories? As Prebble et al (2004) and others have noted, no single empirical method can measure the long-term personal and institutional effects that a programme such as the Certificate in Academic Practice aims to bring about – not because those effects are nebulous or non-existent, but because the programme itself emphasises values, skills and outcomes that vary according to each individual's academic profile, cannot easily be quantified and are designed to unfold slowly over time. This presentation outlines a novel research strategy called "longitudinal archiving": a version of portfolio-based assessment, inspired by arts and humanities research paradigms, that provides researcher with a rich and complex range of assessment materials on which to draw and with critical strategies for doing so.

O 9
01 September 2007 08:30 - 10:30
Room: Harmónia
Symposium

Can we be intelligent about intelligence?

Chair: **Trevor Bond,** Hong Kong Institute of Education, *Hong Kong*
Organiser: **Philip Adey,** King's College London, *United Kingdom*
Discussant: **Jan-Eric Gustafsson,** Göteborg University, *Sweden*

This symposium will explore the notion of general cognitive ability (or 'intelligence') and why the time might now be ripe for educators, after years of animosity towards the notion, to re-consider the power offered by a general intellectual capacity which is itself amenable to educational influence. We review the existing scientific knowledge concerning general mental abilities, including the cohabitation of general and special abilities, cognitive modules, cognitive development, and some evidence for plasticity of the general processor. We will examine why this knowledge does not find its way into mainstream educational theory and practice. We then present a number of models that attempt to synthesise the main aspects of current psychological theories and try to identify the role of general abilities in each. We will then explore how the models might be used as the basis for effective educational application. In particular we will look at various examples of successful cognitive stimulation, where programmes have been shown to have a positive effect on the process of cognitive development, considering both the practicalities and theoretical notions of just what it might be in our cognitive models that is affected by the stimulation. Further practical aspects will be discussed, especially in the context of possible political, cultural and social barriers to the inclusion of general ability as central to most, if not all, educational aims.

Some characteristics of 'general intelligence', and its problematic image
Philip Adey, King's College London, *United Kingdom*

Teachers characterise general ability in terms of both convergent and divergent abilities. They see connectivity as a central characteristic of smart behaviour. Making comparisons, extrapolating, relating causes to effects, or the elucidation of any relationship between variables all involve connectivity - characteristics which accord very well with ideas of intelligence developed by the founding fathers of the idea. A second characteristic of intellectual processing is that it operates across all subject and context domains, but there are also special abilities, and the hierarchical nature of these abilities need to be taken into account in any model of the mind. Thirdly, general mental ability is plastic, amenable to environmental influence. Evidence from population studies and from intervention studies will be described in other papers in this symposium showing that intelligence is open to significant enhancement in an appropriately stimulating environment. Finally, intelligence is characterised by development and by individual differences. The relationship between development and differences is important. Although these characteristics are well-established in the psychological literature, the construct of 'intelligence' remains problematical in educational circles. We can speculate about the reasons for this, but what matters is that an idea which offers a powerful explanatory mechanism for many of the accepted, but essentially pragmatic, ideas currently offered as guides to educators (such as expert-novice distinctions, powerful learning environments, or conceptual change) has been repressed.

Models of the cognitive process and education
Andreas Demetriou, University of Cyprus, *Cyprus*

This paper will first present an outline of information processing models of developing mind. These models presume that the mind involves general-purpose processes defining and constraining processing potentials, such as meaning making efficiency, executive control, and representational capacity, domain-general processes underlying self-monitoring and self-regulation, and domain-specific thought systems underlying representation and processing of different types of information, such as categorical, quantitative, causal, verbal, spatial, and social thought. Learning at each phase of life depends on the condition and dynamic relations between all of these processes. The presentation will show how school performance in subjects such as science, mathematics, and language, depends on each of these processes. Specifically, we will show that up to 70% of the total variance of school performance in these subjects can be predicted from the combination of these processes. Moreover, we will also describe experiments showing how the profile of different persons in concern to these processes shapes what can be learned and how learning can be efficient. For instance, we will show that persons who are high in processing efficiency and representational capacity need less direction in teaching than persons who are weak in these dimensions. The implications of these models and findings for the education of teachers, educational planning and practice will be discussed.

Assessing reason and intellect, school achievement and learning-to-learn: complex cross-sectional and developmental relations of heterogeneous measures
Jarkko Hautamäki, University of Helsinki, *Finland*

The new concept of learning to learn has been adopted in response to modern de-mands of competencies pertaining to lifelong learning. It refers to the cognitive and affective fac-tors central to the application of existing skills to no-vel tasks and to new learning. The L2L framework embraces this idea of general tools formed through good teaching but acknowledges the many structural constraints imbedded in learning and development. The indicators for learning to learn are based on a modified version of Snow's model for educational assessment. Learning to learn is seen to comprise and adhere to several theoretical traditions within the educational sciences. The indicators then combine the theoretical background with a practical solution to the problem of assessing a multi-dimensional phenomenon in school setting. Learning to learn is not seen as a latent feature that can be covered by a singular one-dimensional measurement model, but more to resemble the nomological network, and to take advantage of Gustafsson's ideas of the role of heterogeneous tests for understanding a construct. In the presentation we use several cross sectional, repeated and longitudinal data, collected in Finland, with Finnish Learning-to-Lean Scales, FILLS (www.helsinki.fi/CEA), using representative 5 % samples of Finnish schools and pupils, ages 12, 15 and 17, to describe the relations between constructs. It is possible to show that the relations, say correlations and correlated vectors, remain for cognitive skills essentially the same, and that the beliefs and attitudes are changing following different courses, and, lastly, that the relationships between cognition and attitudes are also changing when the students step in their educational path from a very homogenous primary schools, to homogenous lower secondary into heterogeneous upper secondary schools.

Plastic general abilities: The conception that bridges the gap between the new goals and old practices of education
Benő Csapó, Szeged University, *Hungary*

Acting successfully in an ever-changing, knowledge-rich environment requires a new kind of adaptivity of the knowledge that individuals master at school. Although generally the new mission of schooling has been identified, educational systems still are far form implementing it. Frameworks that provide theoretical background for designing the educational processes are systematically avoiding the conception of intelligence, or general abilities. A model will be presented which integrates three aspects of curriculum development: (1) psychological aspects; (2) the cultural aspects; and (3) the disciplinary aspects. To master long-lasting broadly applicable adaptive knowledge, in each teaching and learning processes all three aspects should be taken into account. This model will highlight some shortcomings of the present mainstream educational thinking. Some international or national frameworks (e.g. PISA frameworks, the DESECO project) will be reviewed with respect to how they deal with the mission of education in a knowledge-based society. These frameworks usually propose general goals compatible with the requirements of the adaptivity of knowledge but when they turn to the specific aims and/or methods to fulfill these goals, the content of learning is often over-emphasized at the expense of general abilities. An unbalanced use of some conceptions (e.g. expertise, novice-expert differences, and conceptual change) does not help. Without the conception of general cognitive abilities the adaptivity of knowledge will not be improved. Some theoretical orientations (e.g. problem solving as application of knowledge in new context, transfer as preparation for future learning) will be reviewed that may provide a basis for the enhancement of general abilities within the school curricula. Some practical content-based program (e.g. CASE) will be used to illustrate the integrated approaches. Without a thorough design of the teaching-learning processes some popular methods (e.g. problem based learning) may fail.

O 10
01 September 2007 08:30 - 10:30
Room: 0.81 Ortvay
Symposium

Learning with dynamic visualisations (Part I): when and why dynamic visualisations help

Chair: **Mireille Betrancourt,** University of Geneva, *Switzerland*
Organiser: **Mireille Betrancourt,** University of Geneva, *Switzerland*
Organiser: **Katharina Scheiter,** University of Tübingen, *Germany*
Organiser: **Huib Tabbers,** Erasmus University Rotterdam, *Netherlands*
Discussant: **Katharina Scheiter,** University of Tübingen, *Germany*

With recent technology advances, computers now offer animated graphic devices, which seem attractive and efficient to designers of instructional materials. However, the research carried out so far failed to establish clear and systematic advantages of using animated graphics over static ones on learning. This symposium presents experimental studies that address the issue of when dynamic visualisations are better than static visualisations and why. First Moreno & Marley replicate the multimedia principle, showing that both animated and static visualisations improved

understanding of a narrated explanation, compared to no visualisation, while there was no difference between animated and static visualisations on learning, cognitive load, and affective evaluation. Similarly, van Oostendorp and Beijersbergen found no difference between dynamic and static visualisations on learning, cognitive load, and confidence, even when signalling cues were added in the dynamic visualisation. In contrast, Hoeffler and Leutner found that a dynamic visualisation was more beneficial for learning chemical processes than a series of either 4 or 11 static pictures. Also using series of static pictures compared to a dynamic visualisation, Schneider and Boucheix found that the dynamic visualisation was equivalent to a series of 5 pictures, but was more effective than a single picture or a sequential display of 5 different pictures. Finally, Seufert and Brunken demonstrated that the benefit of dynamic visualisations depended on the type of information to be learned (process or structure). Confronting these complementary results will foster our understanding of the conditions under which dynamic visualisations are more beneficial to learning than static visualisations.

Do students' verbal and visual abilities and preferences affect their learning and perceptions about learning astronomy with static and animated graphics?
Roxana Moreno, University of New Mexico, *USA*
Scott Marley, University of New Mexico, *USA*

Sixty undergraduate students studied 2 astronomy modules with a multimedia program that included a narrated explanation with animated graphics (A group), static graphics (S group), or no graphics (narration alone or N group). Participants were assessed on verbal and visual measures of learning, learning perceptions, and visual/verbal abilities and preferences. This research extends past research on multimedia effects by showing learning, cognitive load, and affective benefits for A and S groups as compared to the N group. An aptitude treatment interaction was found between students' spatial ability and learning from A and S conditions. Neither verbal ability nor students' reported visual/verbal preferences were found to affect students' learning or affect. The theoretical and practical implications of these results and directions for future research will be discussed in the presentation.

Animated diagrams: Their effect on understanding, confidence and mental effort.
Herre van Oostendorp, Utrecht University, *Netherlands*
Michiel J. Beijersbergen, Utrecht University, *Netherlands*

Animated diagrams representing dynamic systems hold great potential for improving the way people learn since there is a direct correspondence between parts of the representation and components of the dynamic system they represent. However, so far the literature failed to find clear benefits of animated diagrams over static pictures - the established way of presenting. In this study three modes of presentation of dynamic systems are compared: A static picture presentation, a 'normal' animation and a second animated version that contains a cognitively designed feature by spotlighting the main steps. Four questions are examined. First, can we find evidence for a possible difference in knowledge acquisition between the three conditions? Second, can we validate the results of a previous study on animation about the difference in confidence between students on their knowledge acquisition? Third, does the mental effort of students explain the expected difference in their confidence? Fourth, does focusing lead to less mental effort and (still) enhancement of learning? These questions are examined by making use of two different kinds of systems: a presentation of a dynamic system of the human body and that of an artifact. We will discuss the results of the experiment and give suggestions for further research.

Replacing an instructional animation with a series of static pictures: Does the quantity matter?
Tim N. Hoeffler, University of Duisburg-Essen, *Germany*
Detlev Leutner, University of Duisburg-Essen, *Germany*

In a series of three experiments, a computer-based instructional animation about a chemical process was compared to different series of static pictures taken from the animation at crucial points. It was hypothesized that the animation should be superior to a four-picture version but equally effective as an eleven-picture version. In the first two studies, however, it turned out that the animation was more effective in learning outcome than both static versions. This is in line with a current meta-analysis (Hoeffler & Leutner, submitted), but in contrast to other research examining animations versus static pictures (Tversky et al., 2002). Thus, the eleven-picture version did not seem to be as helpful as the animation to generate an accurate mental model (Hegarty, Kriz, & Cate, 2003). By including a higher amount of interactivity it is expected that animation and 11 static pictures will be equally effective for all learners (Betrancourt, 2005). Those results of the third study will be available at the conference as well. As to aptitude-treatment interactions in multimedia learning (see Mayer's, 2001, "individual differences" principle), evidence was found that spatial ability plays a crucial role in constructing a mental model and therefore is important to be considered in choosing between animations and static pictures for purposes of learning and instruction. Spatial ability, measured with a paper-folding test, played a compensating role: Low-spatial ability students showed poor learning outcomes when learning from pictures while high-spatial students did not; when learning from animation, however, learning outcome was independent from spatial ability.

How to improve complex mechanical system's comprehension with animations?
Emmanuel Schneider, University of Burgundy, *France*
Jean-Michel Boucheix, University of Burgundy, *France*

In a series of experiments, we studied when an animation could be necessary to elaborate a "runnable mental model" (Mayer, 2001) for learners with high and low spatial abilities. We explore three ways to improve comprehension of a complex mechanical system: the three pulleys system used by Hegarty, 1992, Hegarty & Just, 1993. The first way concerns the format of the illustration, the second is related to the control of the animation and finally the third way refers to the learner's attention orientation. For all experiments we measured comprehension performances with a comprehension test and we analyzed also the eye tracking data.

Computational efficiency of static and animated pictures. Fostering the acquisition of structural and procedural knowledge
Tina Seufert, Saarland University, *Germany*
Thomas Huk, Westermann Publishers, *Germany*
Roland Brünken, Saarland University, *Germany*

Different representational formats are used to provide different types of knowledge and to assist different learning processes, i.e. they differ in their computational efficiency. In the present study we aimed at specifying the computational efficiency of static versus animated pictures with regard to the acquisition of knowledge about processes and structures. We hypothesized that animated pictures should be efficient in supporting the acquisition of procedural knowledge because they depict the dynamic changes explicitly. Static pictures on the other hand should have advantages in fostering the acquisition of structural knowledge as they are not transient. In order to test these hypotheses we conducted an experiment (N=56) with one group that learned with an animated

version of a learning environment about the synthesis of ATP and another group that received static pictures (both versions with narration). After the learning phase learners had to deal with recall, comprehension and transfer tasks on the molecular structure of the ATP-Synthase as well as on the process of ATP-Synthesis. An ANCOVA with prior knowledge and spatial abilities as control variables revealed that the animated group outperformed the static group concerning the procedural knowledge. With regard to the structural knowledge we found no difference. Obviously the process information could be more easily extracted from the animation whereas the structures could be equally learned in both presentations. This may be due to the specific attributes of the animation without fast changes in the global structure of the depicted molecule. Overall, it seems to be necessary to distinguish the cognitive affordances of a learning task in order to design computationally efficient instructional pictures.

O 11
01 September 2007 08:30 - 10:30
Room: 0.100A
Symposium

Understanding robust learning via in vivo experimentation

Chair: **Kurt VanLehn,** University of Pittsburgh, *USA*
Organiser: **Kurt VanLehn,** University of Pittsburgh, *USA*
Discussant: **Fred Paas,** Open University of the Netherlands, *Netherlands*

The objective of this symposium is to introduce and critique two concepts, robust learning and in vivo experimentation. Learning is robust if it generalizes in predictable ways and it causes far transfer, long-term retention and accelerated future learning. Classroom experiments are in vivo experiments if they attempt to exert control over fine-grained cognitive, social and motivational factors that can influence learning. Attaining this degree of control is facilitated when classrooms use certain kinds of computer software as part of their ordinary practices. The symposium features presentation of 4 research studies that exemplify in vivo experimentation on robust learning, followed by a discussant commenting on the concepts and their likely importance in the science of learning. The talks concern the learning of mathematics, science and second language. The instructional processes studied include meta-cognitive tutoring, help-seeking, gaming, self-explanation, scripted collaborative problem solving and attention focusing in multi-media learning. All the studies were conducted in the LearnLab (www.learnlab.org), a new international resource, operated by the NSF-funded Pittsburgh Science of Learning Center (PSLC), which facilitates in vivo experimentation on robust learning.

In vivo experiments on whether tutoring meta-cognition yields robust learning
Ken Koedinger, Carnegie-Mellon University, *USA*
Vincent Aleven, Carnegie-Mellon University, *USA*
Ryan Baker, University of Nottingham, *United Kingdom*

In a number of in vivo experiments we have been exploring whether automated tutoring at metacognitive level will improve student learning. By performing these experiments in the context of PSLC LearnLab courses, we have more easily achieved features of in vivo experimentation including tight manipulation of a single learning principle, which is facilitated by implementation

within Cognitive Tutor technology, and realistic content, students, and duration, which is facilitated because we can embedded studies within on-going courses. Multiple studies have revealed significant positive student learning benefits for providing metacognitive tutoring support for both self-explanation and error self-correction. Other studies have addressed reducing students' negative "gaming" behavior and increasing their help-seeking skills. These studies have not been as clearly successful and we reflect on why and, in particular, on whether tutoring works less well for student behavior driven more by affective than cognitive factors.

Evaluating collaborative extensions to the Cognitive Tutor Algebra in an in vivo experiment. Lessons learned.
Nikol Rummel, University of Freiburg, *Germany*
Hans Spada, University of Freiburg, *Germany*
Dejana Diziol, University of Freiburgh, *Germany*

We conducted an in vivo experiment to evaluate the effectiveness of a collaboratively enhanced intelligent tutoring environment. We combined the problem-solving guidance provided by a tutoring system with collaborative problem-solving to increase robust learning. To ensure that students benefit from the opportunities provided by this enhanced tutoring environment, we developed a collaboration script guiding students' interaction. The script involved an alternation of prompted individual and collaborative problem-solving, and collaboration reflection after each problem. In the in vivo experiment, we compared scripted collaborative problem-solving, unscripted collaborative problem-solving, and individual problem-solving with the Cognitive Tutor Algebra. The study consisted of a learning phase during which students learned in their experimental condition, and a test phase to assess different aspects of robust learning. Two post-tests administered on the Cognitive Tutor measured the retention of the learned skills in the context of individual and collaborative problem-solving. To evaluate if the collaboratively enhanced tutoring environment prepared students for future learning, a third test measured acceleration of future learning: students were asked to solve novel problems on the Cognitive Tutor. Finally, knowledge transfer was assessed by a paper and pencil test asking students to solve problems that tapped the mathematical concepts of the learning phase in a novel problem format. Conducting the study in the classroom entailed a number of challenges for study preparation, data collection, and data analysis. One issue was selecting a within versus a between classroom design. The disruptiveness of students in the same class using different conditions, and the danger of treatment diffusion militated in favor of the second alternative. Students' absenteeism was another challenge. This issue is particularly problematic in a study on collaborative learning as it affects both data collection and data analysis. We present the results of the study and discuss critical issues of in vivo experimentation.

Learning a tonal language by attending to the tone: An in-vivo experiment
Ying Liu, University of Pittsburgh, *USA*
Min Wang, University of Maryland, *USA*
Charles Perfetti, University of Pittsburgh, *USA*
Brian Brubaker, University of Pittsburgh, *USA*
Suemei Wu, Carnegie-Mellon University, *USA*
Brian MacWhinney, Carnegie-Mellon University, *USA*

Learning the tone system is a major challenge to students of Chinese. Based on the learning principle that attention directed to critical features of a component of a complex input supports learning of that component, we tested hypotheses concerning tone learning in an in-vivo

experiment. First-year students in a Chinese language program at an American university were trained to identify the tones of 435 learned characters and 69 novel characters across fourteen lessons in the first and second semester. Three learning conditions were designed to support tone learning by presenting: (1) visual pitch contours of the tones, together with Pinyin spelling of the spoken syllable (contour + pinyin condition); (2) digits that traditionally represent the tones, together with Pinyin spelling of the spoken syllable (digit + pinyin condition); (3) visual pitch contours without Pinyin spelling (contour only condition). Analyses of student activity logs (learning curves) showed a significant effect of learning condition. The contour + pinyin and digit + pinyin conditions produced significantly faster learning. Furthermore, improvement from a pre-test to post-test was largest for contour + pinyin condition. These findings support the value of redundant multi-modal information sources for supporting the learning of complex linguistic forms that include both segmental and tonal features. Differences between novel and familiar forms further suggest a two-level learning process, one that extracts tone as a general feature to apply to any perceived syllable and one that must acquire each syllable as a unique segment+tone representation.

The role of the self in self-explanation
Kurt VanLehn, University of Pittsburgh, *USA*
Robert Hausmann, University of Pittsburgh, *USA*
Scotty Craig, University of Pittsburgh, *USA*

Does deep learning depend on an individual generating an instructional explanation or will similar learning result from processing equivalent information, while controlling for "active" learning? To address this question, two in vivo classroom studies were conducted in the PSLC physics LearnLab. The first study contrasted the generative learning activity of self-explaining with the non-generative, learning activity of paraphrasing instructional explanations. During a classroom laboratory period on electrodynamics, students were asked to talk aloud as they alternated between solving problems and studying examples. Thus, the data for this study came from problems solved during the training session as well as assigned homework problems. The results suggest that students who self-explained had higher scores on the training problems than students who studied instructional explanations. Moreover, self-explainers displayed evidence of accelerated future learning of a related, yet new domain (i.e., magnetism). The second in vivo study contrasted the level of guidance giving during initial learning of material. Students were presented information on magnetism with deep-level, rhetorical questions for full guidance, pauses for self-explanation where learners build their own guidance, or pauses for reflection where learners were not given encouragement to self-explain. The data from this study also came from LearnLab homework problems. The results suggest that, while there were no differences between the three conditions in terms of their homework performance, those who were provided guidance via deep-level questions exhibited faster solution times than those who were given no explicit guidance. The results from these studies suggest two conclusions. First, prompting students to self-explain or answer deep questions while studying problems in an authentic classroom environment can result in robust learning. Second, it is important to motivate students, not to engage merely in active learning processes, but to also be generative.

O 12
01 September 2007 08:30 - 10:30
Room: 0.79 Jánossy
Symposium

Learning and professional development through computers

Chair: **Erno Lehtinen,** University of Turku, *Finland*
Organiser: **Erno Lehtinen,** University of Turku, *Finland*
Discussant: **Rainer Bromme,** University of Münster, *Germany*

The rapidly developing ICT industry is constantly producing new tools and learning environments (LEs) for university instruction and the workplace. These LEs are creating new potentials for learning, but they also have their drawbacks. In fact, research to date suggests that it may be easier to promote interaction in computer-supported collaborative learning than actual learning outcomes (e.g., Weinberger et al, 2005; Kollar, Fischer & Hesse, 2006). The purpose of this symposium is to address the following questions: 1) What can we as educational researchers offer to promote the effective use of different types computer-supported LEs? 2) Do these new LEs actually promote learning outcomes and positive learning experiences? The study by Dehler addresses the issue of biomedical knowledge acquisition in a collaborative virtual learning environment using the innovative technique of "knowledge mirrowing". In a similar vein, Wecker and Fisher examine scripts and their fading and their effects on the acquisition of applied psychology in the context of computer-supported collaborative learning. Mõller Madsen, on the other hand, examines the effects of different learning strategies adopted spontaneously by university students in the context of the Geographical Information Systems, which has been introduced in the context of basic studies in geography, whereas Siewiorek and Lainema examine the student experience of learning in the context of business education through a modern computer-supported business simulation. Pßyry maintains the perspective of the learner, but examines learning and professional development in the workplace. On the basis of a set of case studies, she examines perceived success factors and challenges for distributed knowledge sharing. The symposium provides some support for the acquisition of complex subject matter as well as fresh insights on how to promote the effective use of computer-supported LEs in the university and beyond.

Using Knowledge Mirroring to foster computer-mediated biomedical knowledge communication
Jessica Dehler, University of Tübingen, *Germany*
Daniel Bodemer, Univ. of Tübingen, *Germany*
Jürgen Buder, Univ. of Tübingen, *Germany*

Higher education is increasingly realized by net-based scenarios often incorporating collaborative activities. This is accompanied with specific benefits but also constraints. In computer-mediated peer-tutoring for example it is more difficult to construct mutual models, thus impairing collaborators´ grounding, audience design and coordination. In this paper `Knowledge Mirroring`, that is providing information about the partner's knowledge, is introduced as technological support developed to compensate for these problems. Effects of Knowledge Mirroring on audience design and knowledge acquisition are studied in a simulated peer-tutoring scenario with explaining as basic activity. Analysis of explanations revealed audience design with respect to usage of elaborations and references. Results regarding knowledge acquisition show that learners provided with Knowledge Mirroring were able to draw more inferences on information distributed across the learning material.

Acquisition of professional knowledge through computer-supported collaborative learning: Is it affected by the fading of scripts?
Christof Wecker, University of Munich, *Germany*
Frank Fischer, University of Munich, *Germany*

Collaboration scripts have been proven to be an effective way to simultaneously increase both the quality of collaboration and the acquisition of domain-general knowledge, e. g., argumentation skills, but rarely to foster the acquisition of domain-specific knowledge at the same time. The fading of support has been suggested as a means to foster learning. It could also be argued, however, that fading neither adds to the appropriateness of the processes stimulated by the script for domain-specific knowledge acquisition, nor helps learners internalize the domain-general knowledge incorporated in the script before the fading starts. As these considerations show, no unequivocal predictions about the effects of the fading of scripts on domain-specific knowledge acquisition are possible at present. Therefore we investigated whether the fading of a script fosters the acquisition of domain-specific and domain-general application-oriented knowledge. We conducted an experimental study with two conditions (no fading, fading), which involved 58 students in dyads. Results revealed that there was no difference between faded and unfaded scripts with respect to both domain-specific and domain-general knowledge acquisition. Limitations with respect to the short duration of the learning phase in our study and the specific type of fading implemented in this study are discussed. The findings suggest that a script can simply stimulate learners to successfully perform cognitive activities that are functional for the acquisition of domain-specific knowledge, while fading might add nothing to this learning process. With respect to domain-general knowledge, the findings substantiate the assumption that merely fading a script is not enough to get learners to internalize it.

Professional development through simulation gaming –
Anna Siewiorek, University of Turku, *Finland*
Timo Lainema, Turku School of Economics, *Finland*

The diverse methods and tools commonly used for teaching business in universities and in management trainings are insufficient to cope with the complexity of organizations and the unstable conditions of today's market (Baker & O'Neil, 2002; Lehtinen, 2002; Machuca, 2000). The use of traditional business simulation games such as batch processed ones in constantly changing business environments is losing meaningfulness. In these kind of games, the problem is that they are static and do not include real world complexity in the form of business processes. In our experiment, business students participated in simulation game sessions in which a real-time processed simulation game was used. Real-time processing means that the simulation is clock-driven and the business processes in the game are transparent to the participants. Therefore, the students could follow their company's operations and material flows evolving hour by hour. This kind of clock-driven environment with a huge amount of transactions produces a complex whole of different business operations, events and flows. The purpose of the study is to examine how business students experienced a simulation gaming environment from the point of view of complexity. The research questions are as follow: 1. Did the students regard the learning environment complex? 2. Was this possible complexity regarded a positive or a negative property? 3. What are the possible causes for the opinions in Question 2? The paper deals with the relation between complexity, ill-structured problem solving and continually processed gaming, and it is divided into three sections. Firstly, we embed complexity and ill-structured problem solving in the framework of real-time simulation gaming. Secondly, we comment on some preliminary findings

on whether it is possible to illustrate real world complexity in an authentic way in a simulation environment without making the learning experience cognitively too demanding.

Professional development in virtual communities of practice
Päivi Poyry, Helsinki University of Technology, *Finland*

The continuously changing business environment is creating growing requirements for fast and effective renewal of employees' competencies and knowledge. Furthermore, the work is more and more often done in virtual co-operation with remote colleagues located in different countries. Thus knowledge sharing with remote colleagues in virtual co-operation and communities has become a central issue in many organizations. This paper reports a case study focusing on the success factors and the challenges in communication context when sharing work-related knowledge in virtual co-operation. Altogether 19 thematic interviews in three business cases were conducted and the interviews were analyzed with qualitative content analysis techniques. The results of the case study are presented as a semantic map comprising the success factors and as an interaction model presenting the actors and artefacts in the communication context. Several elements affecting the successfulness of virtual knowledge sharing were identified in this case study. These include factors such as shared work practices, feeling of community, and attitudes towards knowledge sharing. In addition, the results indicate that the challenges of communicating and sharing knowledge in virtual communities of practice are related to the communication artifacts, to the ICT mediated ways to interact, and to the current work processes and practices.

Geographical Information Systems and the reshaping of geography learning
Lene Moller Madsen, University of Copenhagen, *Denmark*

Geographers have through time used a variety of artefacts such as maps, globes, planimeters etc. as professional tools. Each of these artefacts has in different ways shaped our ways of being geographers. Not only have they shaped how we learn but also what we learn. How and with what effect this shaping has taken place is not explicit or shared common knowledge but an integrated part of the lived experience as a geographer, and part of the professional development of becoming a geographer. New artefacts are constantly introduced into the profession and some have more profound effects than others. One of the latest has been the introduction of a Geographical Information System (GIS), which is a computer-based programme to analyse and visualise information that can be spatially defined. This artefact has revolutionised the way we see and analyses the world, not only for geographers, but for the society at large through available analyses of, e.g., satellite imagery. The introduction and perception of GIS within geographical studies is the focus of this presentation. The presentation gives a view of the development of GIS as an artefact within the geographical profession and how it has been imported into the learning environment and educational system. The analysis is based on an empirical example from the Department of Geography, University of Copenhagen. Further the presentation discusses the effects of introducing the artefact of GIS for the ways we as geographers develop as professionals.

O 13
01 September 2007 08:30 - 10:30
Room: 3.67 Békésy
Symposium

Children's socialization in everyday life of Italian and Swedish families

Chair: **Karin Aronsson,** University of Linköping, *Sweden*
Chair: **Clotilde Pontecorvo,** University of Rome "La Sapienza", *Italy*
Organiser: **Camilla Monaco,** University of Rome "La Sapienza", *Italy*
Organiser: **Lucas Forsberg,** University of Linköping, *Sweden*
Organiser: **Vivian Liberati,** University of Rome "La Sapienza", *Italy*
Organiser: **Pal Aarsand,** University of Linköping, *Sweden*
Discussant: **Margarida Cesar,** University of Lisbon, *Portugal*

The aim of this symposium is to offer a presentation of a study on everyday life of Italian and Swedish middle class families, focusing on the educational practices of parents and on the socialization interactions between children and parents. As it is well known, parents are the primary educators of children: they are responsible for children's early socialization. Our data are drawn from a detailed ethnographic research, within a larger project on family life among concerning dual-earner families in three sites (Italy, Sweden and the United States) sponsored by the Sloan Foundation for studying Family and Work relationships. The overall research includes a range of methodological tools, that were used with each family: interviews to the parents, audio and video tours of the domestic space, carried out by each family member (even children of eight and more), maps of any space of the house and of their furniture, a large number of photos, and mainly video-recordings (with two cameras) of two weekdays (starting early in the morning when the first parent is up and coming back on the same day when the first family member comes back after work and school) and two weekend half-days (Saturday morning and Sunday afternoon); in each visit a third researcher marked, every ten minutes, the activity done in each room by whom. The US site researchers have observed 32 families of different ethnical background, while each of the two European groups studied eight families each: a common condition is the presence of at least two children (one between 8 and 11 year old). In this presentation we are using only the data collected in the Stockholm and the Rome families.

Parents' educational representations and discursive practices
Francesco Arcidiacono, University of Rome "La Sapienza", *Italy*
Camilla Monaco, University of Rome "La Sapienza", *Italy*

This study aims at analyzing, in a qualitative perspective, educational representations and practices within eight Italian families. Since most studies focusing on parents' representations and theories about children's education are based on interviews and questionnaires, we decided to observe and compare "what parents say" and "what they do" within everyday interaction with children. Through this comparison it is possible to study some relevant implicit and explicit aspects of the family educational process. The methodology implies the use of two different instruments of data collection: parents' individual semi-structured interviews and video recordings of family everyday interactions at home. Both these types of data are analyzed following the theoretical and methodological principles of Discourse and Conversation Analysis. Findings show some

differences between the eight Italian families that we studied, concerning the educational representations and practices: even though the analysis process is still in progress, we have found that in some families there are relevant differences between mother's and father's positions about educational matters. Moreover, it is possible also that everyday interactions within family are quite different from what parents say during the interviews. Both parents indeed have their own ideology about education, but during family interactions, they have continuously to re-define and re-negotiate them, in consideration of real contexts and situations of everyday family life. In our opinion, this kind of study can represent a starting point for better understanding parents' representations about the educational process, if one looks also at interactions that occur in natural contexts in order to reach a good vision of how parents practice education as a process.

Learning is labour: Homework as children's work
Lucas Forsberg, University of Linköping, *Sweden*
Tobias Samuelsson, University of Linköping, *Sweden*

Themajorityofstudiesonhomeworkshowthathomeworkisaway of socializingchildrentoafuture working life. By doing homework children learn good study habits and self-discipline. This perspective is also found in public discourses in Sweden – most politicians, teachers and parents see homework as a natural and taken-for-granted part of children's schooling. At the same time there are critical, however marginal, voices arguing that homework should be understood as labour. Within this discourse children are depicted as stressed workers who are deprived of time for play and recreation. In this paper, we analyse how children and parents in interviews and everyday practice relate to homework as both a form of learning for the future, and as children's work. Thus, education and homework are understood as not only a way of learning to labour, but learning is also seen as children's labour. The empirical data are taken from two ethnographical studies in Sweden. One has mainly been carried out through participant observations with video camera in the homes of eight middle-class, dual earner families in a medium-sized city, as well as qualitative interviews with the parents and their 8-10 year old children. The other material consists of questionnaires, qualitative interviews and participant observations with children (in the age 9-16) in a smaller community and in a suburb of a major city.

Parental monitoring strategies on children's homework
Vivian Liberati, University of Rome "La Sapienza", *Italy*
Marilena Fatigante, University of Rome "La Sapienza", *Italy*

In our society, an important duty of the parents is providing their children with education, being this education also codified as a children's universal right in the UN Chart for Children. Emphasis on education has implied not only that parents and other adult partners of the child (teachers, school representatives, policy makers) have worked to build, facilitate and diffuse children's access to formal schooling but, also, that school aims, efforts and practices have entered informal sites of socialization and specifically, family. This is mainly done through children's homework. In Italy, hours devoted to homework accounts for a great part of the children's overall out-of-school time. The burden of children's homework for both kids and their families is such that it gave rise, few years ago, to a national discussion in favor of the reduction of homework. Despite this 'public', and even political interest in the subject, few research has been carried out on the actual participation of, specifically, the dual-career parental couple in the children's homework. Grounding on the analysis of videorecorded family interactions and interviews, the paper illustrates how assisting or monitoring children in doing homework requires parents a great effort and the ability to mediate between the multiple demands of childrearing, household chores and

other domestic activities. At the same time, it provides parents and children with the chance of communicating, topicalizing child's responsibility and commitment to the school tasks; by motivating children to personally commit to the task and deeply understand its requirements, parents stress the importance of the school education as a resource for constructing understanding, competence, and self-improvement. Results are, then, discussed with regard to the construction of a shared framework on education between home and school.

Literacies within family life
Pål Aarsand, University of Linköping, *Sweden*
Emma Abrahamsson, University of Linköping, *Sweden*
Karin Aronsson, University of Linköping, *Sweden*

Family life is an arena where the members recurrently engage in informal learning and teaching practices. Such practices involve distinct types of participation: e.g. as informal apprentices or as masters (Rogoff, 1990; Vygotsky, 1978). Recently, research has shown that informal learning may often involve collaborative learning as in informal communities of practice (Lave & Wenger, 1991). The present paper explores two types of family practices that involve elements of informal learning: computer gaming practices and bedtime story telling. In both cases, family members engaged in collaborative efforts that involved literacy related knowledge that was new to one or more participants. The present work is based on video recordings from an ethnography of everyday life conversations and social interaction in Swedish middle class families (within a larger study of families in three sites: Italy, Sweden and USA). The analyses concern computer gaming and bedtime storytelling practices within both sibling interactions and intergenerational encounters. Methodologically and theoretically, the present paper tries to situate informal learning within language socializing practices that draw on a detailed study of talk-in-interaction (c.f. Goodwin, 2002; Goodwin, Goodwin & Yaeger-Dror, 2002; Ochs, 1992; Pontecorvo, Fasulo & Sterponi, 2001).

O 14
01 September 2007 08:30 - 10:30
Room: 0.99
Symposium

From dialogical to trialogical learning:Knowledge practices in higher education and teacher training

Chair: **Sarah Schrire,** Hebrew University of Jerusalem, *Israel*
Organiser: **Sarah Schrire,** Hebrew University of Jerusalem, *Israel*
Organiser: **Minna Lakkala,** University of Helsinki, *Finland*
Discussant: **Paul Kirschner,** Utrecht University, *Netherlands*
Discussant: **Charles Crook,** University of Nottingham, *United Kingdom*

The presentations in this symposium examine various aspects of trialogical learning, an approach that emphasizes knowledge creation, and the object-oriented and mediated nature of human activity. Sfard (1998) has proposed two metaphors for learning: the acquisition (monological) metaphor that sees knowledge as something that one "has" or does not have, and the participative (dialogical) metaphor, which highlights the social nature of knowledge. The trialogical model,

proposed by Paavola and Hakkarainen (2005), helps us to understand the processes underlying knowledge creation, especially as it takes place or is enabled in educational contexts and in collaborative work within and between organizations. The studies presented here were conducted in the framework of the KP-Lab (Knowledge Practices Laboratory) EU project. Three studies relate to trialogical learning in higher education; the other two represent teacher training contexts. The presentation from the University of Helsinki examines the design principlesthat enhance a trialogical approach to learning through pedagogical arrangements and supporting technology. The presentation from the University of Applied Sciences in Austria, through a pedagogical scenario on professional internships in higher education, examines how the development of shared artifacts encourages individual and collective reflection in a web-based learning environment. The presentation from Karolinska Institutet describes a model used for the analysis of teamwork in pediatric simulations in a hospital setting. The conceptual model facilitates learning from other members in the teams. The presentation from University of Neuchatel explores the role of argumentation in the teaching of science. By playing both learner and teacher roles in argumentation scenarios, students develop knowledge of teaching practices, knowledge of how science evolves, and knowledge of argumentation. The presentation from the Hebrew University of Jerusalem examines the application of two aspects of trialogical learning to a context of pre-service English teacher training: theory-practice connections and boundary-crossing between disciplines and across organizations.

Pedagogical design for trialogical approach on learning
Minna Lakkala, University of Helsinki, *Finland*
Sami Paavola, University of Helsinki, *Finland*
Hanni Muukkonen, University of Helsinki, *Finland*
Erkki Ramo, EVTEK University of Applied Sciences, *Finland*

The present study explores diverse ways of understanding basic approaches to learning. Our particular focus, the knowledge-creation approach, highlights the activities where people collaboratively develop new artefacts and products or commit themselves into long-term processes of working and learning. We call this approach 'trialogical' to differentiate it from those models of learning which emphasize processes within the human mind ('monological', knowledge acquisition approach), and from those approaches emphasizing social practices or interaction ('dialogical', participation approach). In the presentation, we will discuss the general design principles for enhancing a trialogical approach to learning through pedagogical arrangements and supporting technology. The design principles have been developed in a large research and development project, KP-Lab (Knowledge Practices Laboratory), funded by the EU. We will apply the specified framework of pedagogical infrastructures, which includes technical, social, epistemological and cognitive components, to examine the design of one higher education course as an example of pedagogical practices that are thought to promote trialogical learning.

Using shared artifacts and web-based learning environments to foster collective reflection among students in internships: A design-experiment
Christoph Richter, University of Applied Sciences, Campus Hagenberg, *Austria*
Christian Vogel, University of Applied Sciences, Campus Hagenberg, *Austria*
Eva Zoeserl, University of Applied Sciences, Campus Hagenberg, *Austria*
Heidrun Allert, University of Applied Sciences, Campus Hagenberg, *Austria*

The paper describes and discusses a pedagogical design aimed to foster individual and collective reflection on working practices among students during their internships. The pedagogical design

has been inspired by the knowledge creation metaphor of learning and the design principles for trialogical learning as proposed in the context of the Knowledge Practices Laboratory Project. The study focuses on the creation of shared artifacts to foster individual and collective reflection in a web-based learning environment. The pedagogical design is discussed against the outcomes of a design experiment aimed to examine the viability of the scenario from a pedagogical, technical, as well as organisational point of view and its actual impact on students' individual and collective reflection processes.

Developing skills to observe and analyze communication and teamwork in pediatric team training simulations
Klas Karlgren, Karolinska Institutet, *Sweden*

Good communication and teamwork is essential for efficient medical teams. But even experienced practitioners often lack a conceptual model for describing critical team incidents and need training in identifying problematic and successful teamwork. A conceptual model, the TeamApgar, has therefore been developed to be used in pediatric simulation courses in neonatal intensive care. The model has a focus on crucial, observable team and leadership behavior and has gradually developed and evolved after having been tried out in the courses. Several teams have participated in a study where they have been asked to report on expectations, self-efficacy, stress, and key issues concerning teamwork and team communication. The questionnaires were handed out "in situ" and were "interactive" in that participants not only responded at the start and the end of the courses, but also in relation to each simulation that took place: just before taking part in a simulation, just after and right after each feedback session giving rich information about how different simulations are viewed by participants and how teams develop during a course. Preliminary results show that participants report that teamwork performance and communication is clearly improved during the simulation courses and also that they have become better at making observations about teams. The questionnaires are not only a data collection tool but also a pedagogical tool; the rating of statements in the questionnaires was a way of structuring participants' observations and supporting them in creating analyses of team performance and also a shared knowledge object during debriefings. The model makes other participants' views and observations more publicly shareable and thereby facilitates learning from each other.

A trialogical approach on teaching and learning argumentation in science at University: how do new conceptual knowledge and practice-bound knowledge evolve?
Nathalie Müller Mirza, University of Neuchatel, *Switzerland*

If argumentation is conceived now as a powerful tool for learning, argumentative practices in classrooms are still rare and teachers find it difficult to set up pedagogical activities. If the teachers generally link these difficulties to lack of time and institutional pressures, other reasons are probably at stake. Teaching with argumentation implies an unusual position for the teacher who is no longer the only one who knows but rather a "guide", a facilitator in the co-construction of knowledge. But maybe more important, it implies for the teacher a quite new definition of what science is, focusing on its "argumentative" dimension. Working on the link between learning and argumentation and its conditions in teacher training contexts is therefore an important topic. This paper takes as object a pedagogical design that took place in a University level course. The students, in small groups, are invited to elaborate and test an "argumentative scenario" in science. They have to experiment both positions: the one of the "pupils" and the one of the "teachers". From the analysis of the data collected (pre and post questionnaires, observations, 'diaries' written by the students, and argumentative maps), this paper aims at showing that in learning to teach

argumentation "by doing (collectively)", not only do the participants develop new understanding of teaching practices and knowledge on psychosocial issues of argumentation, but they also (start to) build a new professional image of themselves and of science. In the conclusion we shall discuss the results in stressing the difficulties and the contributions of teaching argumentation in higher education. We will discuss in particular the potential benefit to teach argumentation through argumentation.

Teaching what you learn; learning from what you teach
Sarah Schrire, Kibbutzim College of Education & Hebrew University, *Israel*
Tina Waldman, Kibbutzim College of Education, *Israel*
Nira Trumper-Hecht, Kibbutzim College of Education, *Israel*

Pre-service teachers of English as a Foreign Language (EFL) in teacher training frameworks in Israel have to acquire discipline knowledge, pedagogical expertise, and proficiency in the use of technological tools. Many of these future teachers are not native speakers of English and are required to attain a prescribed level of spoken and written proficiency in English during the course of their studies. In an innovative multi-disciplinary project where the students (first year pre-service teachers) worked as tutors to 8th grade pupils (14-15 year-olds) in a community school, the linguistic, pedagogical, and technological branches of their studies were integrated. Groups were formed, each comprised of one student teacher from the college and two pupils from the school. After writing about specific topics in their written proficiency studies, the college students used these same topics as the basis for communicating in English through email exchanges and online chats with their pupils. They applied a variety of pedagogical techniques to promote writing among the pupils that they tutored, many of which were adaptations of those that they had themselves experienced as students in their proficiency course. Each group also prepared digital presentations in English on topics of mutual interest. The study combines the analysis of the learning artifacts developed collaboratively by the students and pupils, student reflections, observations, and the researchers' own reflections as teacher trainers. The presentation will focus on the issues emerging from this multi-disciplinary approach to teacher training. In keeping with the central concepts underlying the KP-Lab (Knowledge Practices Laboratory) project of the EU, the trialogical learning and teaching elements characterizing this specific teacher training context will be analyzed. Cross-boundary processes will be described, the connections between theory and practice in teacher training will be discussed, and the pedagogical metaphors implicit in this framework will be defined.

O 15
01 September 2007 08:30 - 10:30
Room: 0.100B
Symposium

Postgraduate peer learning

Chair: **Olga Dysthe,** University of Bergen, *Norway*
Organiser: **Olga Dysthe,** University of Bergen, *Norway*
Discussant: **Kirsti Lonka,** University of Helsinki, *Finland*

The aim of this symposium is 1) to present research based knowledge of good practices of postgraduate peer learning in Higher Education contexts and to discuss advantages and problems, 2) to discuss similarities and differences of such practices in different European contexts and 3) to contribute to a retheoretization of postgraduate education that takes into account the community and interactional aspects of learning. Scientific and educational relevance: Internationally there has been an increasing policy focus on the importance of the postgraduate sector as vital in delivering the 'knowledge workers' that future societies will be more and more dependent upon. Evaluation studies of postsecondary education have revealed, however, that high drop out and slow completion rate is a problem in most countries. At the same time, the number of postgraduate students is increasing, and the universities are under pressure to provide teaching and learning environments that enable more students to complete high quality studies within the given time frames. The pedagogical answer to this has largely been to focus on improving individual supervision. In this symposium we present a different answer: more focus on peer learning practices and on building a community of learners and researchers. The four contributions to this symposium document different aspects of communal learning at postgraduate level. There is a need to reconceptualize postgraduate pedagogies both theoretically and in practice in terms of supplementing individual supervision with more community based approaches. In addition, peer learning activities are not only crucial to the students' academic development but also to their future working life, where team work is required.

Three cases of postgraduate peer learning practices – crucial factors of success
Akylina Samara, Department of Education and Health, *Norway*
Olga Dysthe, Department of Education and Health, *Norway*

This paper presents three case studies of how Ph.D. candidates from various disciplines at the University of Bergen in Norway engage in peer learning practices of different kinds. In the first study, candidates from the Department of Social Sciences participated in interdisciplinary writing groups with the purpose of giving feedback on each others' texts. The second study investigated the interactions over a year in an interdisciplinary Ph.D. Research School at the Faculty of Arts. The third study followed up two Ph.D. Biology candidates in a research group at the Faculty of Natural Sciences. The paper discusses these three cases from the perspectives of communities of practice (Lave & Wenger, 1991) and peer learning (Boud & Lee, 2005). The findings indicate that participation in peer learning activities is beneficial to the candidates' research and writing process, and that it enables the development of supervision and communication skills. In addition, peer learning practices create a professional and social community for the candidates. However, in order to enable the candidates' enculturation into the discipline, active engagement of the senior staff members and especially of the candidates' supervisors is required. Peer learning practices that are not supported centrally from the department, or where the supervisors do not contribute

actively, do not facilitate the candidates' "legitimate peripheral participation" (Lave & Wenger, 1991). At the same time, the senior members need to actively help the candidates internalise the cultural codes that give access to active participation. In the opposite case, such activities promote a candidate-peer culture, and do not enable the candidates' progression from peer-student to peer-colleague (Boud & Lee, 2005).

Communities of learning in postgraduate education: a UK case study of the experiences of social science research students
Lisa Lucas, Graduate School of Education, *United Kingdom*
Rosemary Deem, Graduate School of Education, *United Kingdom*
Marina Gall, Graduate School of Education, *United Kingdom*

The paper reports findings from an exploratory, interview-based, study of UK social science research students and their programme directors at a research-intensive university, Park University. The experiences of research students have been studied by other researchers but the emphasis of previous research has tended to either on supervision practices and experiences or has concentrated on research training. In this paper, however, there is a particular focus on the collaborative and peer learning experiences of a small purposive sample of social science PhD students, and also consideration of the gaps in that experience. The pedagogical consequences of these experiences are debated, including thinking through how research students are supported outside the context of their main supervisory relationship and how to faciliate the eventual contribution of research students to knowledge production and the knowledge economy through membership of teams and networks. In the UK, although joint supervision of doctoral students is now becoming somewhat more widespread, it is still common for students to have only one main supervisor, so more collaborative learning often requires a special effort. Group co-operation and learning amongst doctoral students in the laboratory-based natural sciences is found more frequently than for PhD students in the social sciences, so the latter can often feel isolated and do not necessarily benefit from learning within a group of peers except when undertaking research training. The paper suggests ways in which existing collaborative and peer learning experiences of doctoral students can be enhanced and developed by using pedagogies that go well beyond the supervision of individual students.

Research leadership: Productive research communities and integration of research fellows
Sten Ludvigsen, University of Oslo, *Norway*
Turi Oevre Digernes, University of Oslo, *Norway*

In this paper we focus on what may be described as especially productive research environments, aiming to understand how productive research environments are developed and maintained. We will in particular look at different approaches related to research leadership and what this means for research communities, and the research fellows' work. Previous studies of research emphasize that research organizing is going through a change, from individual to collective models. Here, the research leadership will play a significant role. This tendency, which has been seen for a long time within the research communities in medicine, science and technology, is starting to break through also when it comes to knowledge domains within social science, educational science and humanities. In these domains collective models for research organization are probably the field of research where this trait of development is the weakest today. We have chosen three different research communities, and the analyses of these are based on interviews, observations and document data (media studies, computer science and historical studies). All three communities are recognized both nationally and internationally, and they have all been awarded several large

research grants. They all work within what we can describe as "text" producing research, which means within a genre where the text itself and the arguments are given high significance. This includes different kinds of field research and empirical designs. Our questions are: How does one establish a joint focus in a research community? Which norms and standard are developed, and to what degree do these norms and standards structure the researchers' work and learning? What kind of implications will this have on the research fellows' learning environment?

New patterns of doctoral education?A typology of educational patterns of German PhD-holders from the 1990s

Andrea Kottmann, University of Twente, *Netherlands*

In Germany at the end of the 1990s, a Graduate School Movement developed. This movement put different goals for the reform of doctoral education on the agenda. Besides claiming to structure doctoral study as a third cycle of higher education, it targeted the work-relationship between a supervisor and a candidate and aimed to strengthen the research component of doctoral education, as well as preparing PhD-holders for (international) academic and non-academic careers. At the beginning of the 1990s, the German Research Foundation (DFG) offered a new program for research funding: The main target of these so-called "Graduiertenkollegs" (research training groups) was to strengthen the research abilities of young researchers while completing the PhD. Therefore research training groups should offer an research (interdisciplinary) program, an accompanying study program, transparent and innovative advisory structures and provide opportunities for international mobility and networking. In practice, research training groups had to structure themselves and to perform incrementally. Different types of research training groups, ranging from groups just following the original path of doctoral education to groups resembling a perfect model of graduate schools could have been built up. Based on a survey of 4.600 PhD-holders, of which the one sub-sample graduated in research training groups, the other in a traditional setting during the 1990s, different types of doctoral education will be distinguished and described. The paper will examine which different types of doctoral education have been established within these research training groups, and what effects these educational conditions have had on the later careers of PhD-holders. The effects of these types on success indicators like time-to-degree, professional success and general satisfaction will also be explored.

O 16
01 September 2007 08:30 - 10:30
Room: 0.83 Eötvös
Symposium

Communities in learning contexts: Building knowledge, building identities

Chair: **Bianca Maria Varisco,** University of Padua, *Italy*
Chair: **Stefano Cacciamani,** University of Valle d'Aosta, *Italy*
Chair: **Beatrice Ligorio,** University of Bari, *Italy*
Organiser: **Bianca Maria Varisco,** University of Padua, *Italy*
Organiser: **Stefano Cacciamani,** University of Valle d'Aosta, *Italy*
Organiser: **Beatrice Ligorio,** University of Bari, *Italy*
Discussant: **Carl Bereiter,** Institute for Knowledge Innovation and Technology, *Canada*
Discussant: **Neil Schwartz,** chico univerity Usa, *USA*

The learning environments today are more and more spaces and situations where everybody builds one's knowledge and one's identity in collaboration with other people and communities. These spaces and situations are environments and opportunities for meeting, sharing, developing, articulating or reinforcing one's personal, social, professional self. In the last years we have seen an important development of different models of communities working in different learning contexts where knowledge and personalities emerge and are articulated. This symposium examines: a) the nature of social and dialogical interactions into various learning contexts and through different perspectives (face to face, blended and on line contexts); b) the relation between the dialogic interactions and the identities of specific communities' actors: academic students. The first paper (Scardamalia and Bereiter) describes the characteristics of the Knowledge Building Communities, where the processes occur. The second paper (Cacciamani) examines the relation between knowledge building activity and social position in the production and in the appropriation of ideas in academic students during an on-line course in Higher education. The third paper (Grion, Luchi, Varisco and Cecchinato) analyses the differences between the emergent professional identity in student teachers and the strengthened professional identity in teacher in-service during an on line university laboratory based on work cases. The fourth paper (Spadaro and Ligorio) analyses the perception of self on face to face and on line academic learning contexts finding two distinctive I-Position profiles of university student. Finally the fifth paper (Hamido and Céêsar) present an inquiry about reconstruction of a teacher education curricula project. It analyses personal/interpersonal dimensions. The research shows a prevalence of an unilateral conception of professional identity construction.

Learning communities and knowledge building communities: Is there a difference?
Marlene Scardamalia, University of Toronto, *Canada*

In this paper we present some crucial aspects to distinguish Learning Communities from Knowledge Building Communities. This distinction is focused on differences based on classroom observations and on the descriptions offered by various learning community practitioners and advocates. We consider, however, that the difference runs deeper than observation of classroom phenomena can reveal. The key points of these differences are expressed in terms of targeted knowledge, students inquiry and research, role of students' own ideas and "theories",

collaboration, discourse and culminating activities. The six contrasts mentioned represent a starting point for exploration of differences between socio-cognitive pedagogies, an essential process if the learning sciences are to progress.

Knowledge building activity and social position in an on line university course
Stefano Cacciamani, University of Valle D'Aosta, *Italy*

The study shows that the production of ideas, based on writing activity and the appropriation of ideas, based on reading activity in an on line environment, seems to be stable during an on line course, without correlation. Also the social position seems to be stable during the community activity and a correlation between social position in production and appropriation ideas emerged. The author highlights that the process that allow the movement of participants from the edge to the center of the community interaction, as the legitimate peripheral participation principle foresee, need to be study in depth in on line interaction.

Sharing a professional identity throught on line communication
Valentina Grion, University of Padua, *Italy*
Francesco Luchi, University of Padua, *Italy*
Bianca Maria Varisco, University of Padua, *Italy*
Graziano Cecchinato, University of Padua, *Italy*

Learning to become an effective teacher is a long and complex process. Professional identity is a fundamental dimension in this perspective. It is essential to inquire about how teacher identity is gradually constructed in teacher education programs. How does context promote this construction? This paper presents a research in this direction. The focus is on teacher professional identity construction through an on-line university laboratory. The main question research is whether there is a stimulating context for pre-service and in-service students teachers for developing their professional identity. In a constructivist-social-cultural perspective we have analysed own personal "good teacher" profile description, the dialogical process and the shared written case-works of 47 students of Educational Science Faculty of Padua University. We find that the elaboration of identity is different in pre- and in-service teacher education. The students' workers are characterized by a rooted professional identity that is unavailable to modify itself and hardly embodied. Instead, through activities, pre-service students articulate a beginning professional identity that is correlated with flexible personal and social identities. We came to a conclusion that the proposed learning activities foster professional identity changes in pre-service student teachers, it don't happen in in-service teachers. That is the point of start for our future research.

Perception of the self on ftf and on-line learning contexts
Paola F. Spadaro, University of Bari, *Italy*
M. Beatrice Ligorio, University of Bari, *Italy*

Learning and identity have a strict and interesting relationship. We learn what we perceived as useful for the identity construction process and, at the same time, learning outcomes are considered as symbolic resource for the perception of who we are. In order to exploit this relationship, the identity definition given by the Dialogical Self theory is particularly useful: a set of I-Position changing over time and contexts. Thus a learning context composed by ftf and on-line occasions to interact should foster many and different I-Positions. In this paper university students attending a blended learning course were tested at the end of the course. Three learning contexts were presented (ftf lessons, internet and the specific platform where the course was

hosted) and for each of them students were required to give three adjectives. The 324 adjectives obtained were clustered into 11 categories. Each learning context produced a specific distribution of the categories; furthermore two distinctive profiles of I-position emerged: a) the concrete students and b) the emotional students. This result helps on understanding the complexity of the learning phenomena and the importance of allowing students to provide them a wide array of learning occasions, both on line and ftf.

Professional identities and culture: Change as an opportunity for learning
Gracinda Hamido, University of Lisboa, *Portugal*
Margarida Cesar, University of Lisboa, *Portugal*

This work intends to describe and to discuss some results of a research project whose main aim was to analyse and interpret an ongoing process of reconstruction of a teacher education curricular project. We mobilised three conceptual frameworks which gave way to three analysis dimensions: (1) curricular; (2) organizational; and (3) personal / interpersonal. Using an ethnographic approach and a case-study methodology, we interviewed twenty participants, all teacher educators in the course under study. We also made observations of three to four classes from each of those teachers and had access to several meetings in which they were involved, and to documents related to this process. Our main purpose is to discuss some results we obtained in the personal / interpersonal analysis dimension, which concerned the ways participants interactively constructed and represented meanings, relations and identities, in the context of the course's curricular reformulation. Thus the research question we analyse is: Which are teacher educators' ways of framing the change process and eventually solving the dilemmas it implies? Data were treated and intercrossed through a content analysis process, developing a grounded and holistic interpretation. The process under study mobilised identity elements (both internal and external self positions, as well as previous relational stories) corresponding to particular ways of relating to knowledge, to the teaching profession and to colleagues from the same and from different scientific areas. It also involved dialogues and emerging conflict management in which organizational and cultural dimensions, as well as the learning potential of change was illuminated.

O 17
01 September 2007 08:30 - 10:30
Room: -1.63
Symposium

Improving teaching and learning in the middle years: The role of subject cultures

Chair: **Russell Tytler,** Deakin University, *Australia*
Organiser: **Russell Tytler,** Deakin University, *Australia*
Discussant: **Julian Williams,** University of Manchester, *United Kingdom*
Discussant: **Julianna Szendrei,** University ELTE TOFK, *Hungary*

Improving teaching and learning in the middle years of schooling (Years 5 to 9) receives particular attention because of the coincidence of the disengagement of students with the significance of these years for the preparation of students for their future role in society. For some time now there have been substantial criticisms of the quality of teaching and learning in science and mathematics

in the middle years. The Improving Middle Years Mathematics and Science: The role of subject cultures in school and teacher change (IMYMS) project has taken a strong pedagogical focus in supporting improvement in student learning. Pedagogy projects tend to emphasise generic formulations of thinking, learning and pedagogy. However, mathematics and science operate as distinct cultures in schools, reflecting the different forms of knowledge they represent, their status in the curriculum, and their underlying values. IMYMS has focused particularly on this issue to explore how teacher pedagogy, student perceptions, and the change process, might be influenced by the different subject cultures of science and mathematics. IMYMS has been working for 3 years with 32 primary and secondary schools. The project team has developed materials to support schools, and a variety of monitoring instruments relating to team communication, teacher practice, student attitudes and learning preferences, as well as conceptual and procedural outcomes. The five presentations in this symposium will address: ∑ The nature of the change model underpinning IMYMS and factors that affect the change process ∑ A framework for describing and monitoring effective pedagogy in mathematics and science ∑ The role of subject cultures in middle years pedagogy explored through a mapping of teachers' current practice ∑ Constructing pedagogy using teachers' reflections on video footage of their classroom practice, and focus group discussions. ∑ Student attitudes and perceptions and the change process

A model for school innovation in the middle years – Effecting teacher and school change
Russell Tytler, Deakin University, *Australia*

This Presentation describes the 'School Innovation' (SI) model for school innovation underpinning IMYMS, that has been developed and refined over a number of large scale Victorian projects focused on pedagogical innovation in the middle years, including 'School Innovation in Science' (SIS) project and the Victorian Government pedagogy platform 'Principles of Learning and Teaching'. The SI model utilises an action planning process with a number of specific support elements including auditing and monitoring instruments focusing on teacher practice, student perspectives, and professional learning team processes. The paper will draw on research over eight years, using a range of methodologies, to describe the development and evaluation of teaching and learning frameworks and the associated auditing instruments, and the principles underpinning the model (Tytler 2003, in press). Results from SIS in particular will be used to provide insight into the nature and extent of change in school and teacher practice and student outcomes, and identify key issues associated with promoting and managing change. Experience from the IMYMS project will be used to explore the factors that affect the process and degree of change, including leadership issues, time and resource provision, support structures, rurality and communication, and the influence of disruptions in the school development process. It will particularly focus on the ways in which the change process differed for mathematics compared to science, in terms of the different status of the subject within the curriculum, and subject culture dimensions that affected school planning regimes, the type of focus taken during the project, epistemological presumptions, and school support structures. The paper will discuss the issue of the nature of innovation in relation to school and cluster actions, and sustainability.

Multiple Engagements: Teachers and the characteristics of effective mathematics teaching practice
Brian Doig, Deakin University, *Australia*

This Presentation critically analyses a clinical tool, Component Mapping, used in the IMYMS project as a strategy for teachers, and researchers, to examine teacher practice. The construction

and validation of such tools is a critical step in advancing research on understanding and changing teacher practice, An example that uses those factors that are generally believed to be critical to successful Middle Years teaching and learning is provided. The first section reviews the literature on effective teaching practice, draws out the common themes in the literature on effective Middle Years teachers, and argues that these themes support the construction of a Component Mapping tool specifically for Middle Years teachers. This Component Mapping technique is essentially a structured clinical interview with a Likert-type format where responses to questions within the interview are recorded on a rating scale. Hence the data are ordinal and need to be transformed into an interval scale. This transformation can be effected by using Item Response Theory. However, given that the report of the Component Mapping exercise is critical to its impact on teachers and their practice, the second section of the paper suggests ways in which such a mapping can be reported in order to make teacher practice explicit comprehensible, and readily shared between practitioners. Although this technique is not new the reporting format that can be constructed, from the IRT analysis provides an innovative approach to understanding teacher practice. The paper concludes with an example using data from the IMYMS project that shows how the IRT analysis, and the reporting format derived from it, can be readily interpreted by practitioners and researchers alike. This example uses data gained in Victoria, Australia.

The role of subject cultures in middle years pedagogy
Susie Groves, Deakin University, *Australia*

A prior condition for improvement in any subject is agreement on the nature of effective teaching and learning. While constructivist learning theories, and socio-cultural theories based on the work of Vygotsky, have underpinned two decades of research into student learning in both mathematics and science, these theories have taken rather different forms. The Improving Middle Years Mathematics and Science (IMYMS) project is investigating the role of mathematics and science subject cultures in mediating change processes in the middle years of schooling. The project has its roots in the Science in Schools research project (SiS), which developed a successful strategy for improving teaching and learning science based on two major aspects: the SiS Components — a framework for describing effective teaching and learning in science — and the SiS Strategy — a strategic process for planning and implementing change. The IMYMS project is exploring the extent to which the SiS Components and Strategy can transcend subject boundaries by working with four clusters of schools from urban and rural regions in the Australian state of Victoria. Based on reviews of the literature on effective teaching and a series of interviews with fifteen effective teachers of middle years mathematics, the SiS Components were redeveloped to produce the IMYMS Components of Effective Teaching and Learning. These Components formed the basis for a Component Mapping process through which teachers rated their practice on a five-point scale. This paper explores similarities and differences between mathematics and science teachers' perceptions of their practice revealed through the IMYMS component mapping process. Results show that secondary science teachers rated themselves significantly higher than mathematics teachers on a third of the 27 sub-Components, with mathematics teachers rating themselves higher on only one sub-Component, while there was very little difference in the responses of primary teachers. Extended summary

Cultural scripts for action: Understanding the relationship between subject cultures and pedagogies surrounding mathematics and science
Linda Darby, Deakin University, *Australia*

This research investigates the cultural traditions and norms surrounding the teaching of mathematics and science at junior secondary school level. Relationships between subject cultures and pedagogies surrounding school mathematics and science bear exploration because in many Australian schools the there is a common expectation that teachers trained in one subject will teach in both areas. Through classroom observation and videoing, and interviews with 6 teachers of maths and/or science, the research has isolated elements of the subject cultures that provide fruitful comparison across mathematics and science, and that highlight the interaction between the subject cultures and pedagogies. This presentation maps out an argument for viewing these elements in terms of a "cultural script for action." This type of explication of the nature of different elements of the subject culture can inform teachers as they move between subjects and develop a sense of agency and identity in relation to the subject.

Student attitudes and perceptions and the change process
Annette Gough, RMIT University, *Australia*

This presentation explores student learning characteristics (particularly their affective characteristics) as factors that potentially affect the quality of the change process for teaching and learning in the middle years. No matter how sound or innovative the model or strategy, for effective teaching and learning to occur, the instructional procedures need to be matched to the learner characteristics (achievement, cognitive styles, conceptual levels, personality characteristics and affective characteristics). It focuses on what the research literature says about students' affective characteristics and then discusses these in relation to the findings from student surveys on attitudes and learning preferences from IMYMS, across mathematics and science, and on a series of in depth interviews of primary students concerning their perceptions of science and how they learn it. Students' motivations and attitudes are relevant for the achievement of the widely held goal of science education: to develop a numerate and scientifically literate society. Concerns about secondary school students' attitudes to science are shared throughout the Western and non-Western world, and researchers have studied students' attitudes and motivation in science from a number of different perspectives. By studying students' attitudes and learning preferences the IMYMS research offers possible explanations for the persisting problem of the apparent alienation of young people from science and mathematics. Student responses on attitude scales show interesting variation across mathematics and science, and across primary and secondary schools. Such attitude research is intended to provide a sound basis on which to make informed decisions about aspects of classroom practice which enhance the experiences of young people in their science lessons. The research findings supports the importance of engaging students' attitudes, interests and motivation in science if they are to increase their achievement in science and mathematics and the paper discusses the ramifications of the survey findings for future classroom practices.

O 18
01 September 2007 08:30 - 10:30
Room: 1.60
Symposium

School Environment and its impact on student's competences

Chair: **Katharina Maag Merki,** University of Education, *Germany*
Chair: **Brigitte Steinert,** German Institut of International Educational Resea, *Germany*
Organiser: **Katharina Maag Merki,** University of Education, *Germany*
Discussant: **Eckhard Klieme,** German Institut of International Educational Resea, *Germany*

Studies in school effectiveness research have highlighted the impact of school and classroom factors on students´ competences. In spite of studies which have found many correlations between characteristics of school environment and students´ competences, there is a lack of studies with longitudinal and multilevel designs which analyses the effects of school and classroom factors on students´ outcomes over time. The aim of this symposium is to examine the impact of school and classroom factors on students' domain specific and cross curricular competences. The various contributions to the symposium apply different research strategies. Besides longitudinal analyses, which describe the development of various student outcomes and their interrelation at individual and school level over time, the symposium includes studies that use multilevel analyses (school, classroom, individual level) and structural equation modeling. The results of the studies presented in the symposium give insights into the dimensionality of some school and teaching characteristics and their structure as pattern of instructional context. The findings can serve as basis for further investigations with extended longitudinal or experimental design and for further school improvement activities.

"The impact of the instructional context in schools on students' language achievement in Germany
Brigitte Steinert, German Institut of International Educational Resea, *Germany*

School effectiveness research has identified various characteristics of schools that account for differences in students´ outcomes between schools. As a result, school development research has highlighted the characteristics that are malleable by teachers. Particularly, the concept of professional learning communities aims to characteristics for school improvement: focus on student learning, shared norms and values, collaboration, reflective dialog, de-privatization of practice. Therefore, this contribution investigates the dimensionality of goal and achievement orientations and different contents and forms of cooperation among teaching staff and their impact on students´ language achievement. Data base for the analyses was the large scale assessment study DESI (German English Student Achievement International) consisting of a representative sample of 10543 students and 219 schools. DESI investigated a range of language competences both in German and English at grade 9. Two-level structural equation modeling with Mplus was applied to the data. The analyses identify three different constructs of instructional context based on the perceptions of staff: anticipation of students´ language achievement, the emphasis on students´ language competences, cooperation. The impact of these dimensions depends on the investigated criterion for language competences. Concerning the cumulative outcomes at the end of grade 9 the anticipation of language achievement is positively correlated with students´ achievement in German as well as in English. The cooperative practice among staff is negatively correlated with students´ achievement in English. The emphasis on language competences by staff enhances the increase in students´ language competences above all.

Teaching characteristics as moderating variables for the relationship between motivational-emotional components and meta-cognitive strategies
Katharina Maag Merki, University of Education, Freiburg, *Germany*
Markus Wirtz, University of Education, Freiburg, *Germany*

The competence of self-regulated learning is an important cross-curricular educational goal within school curricula and supports the acquisition of domain specific competences. Although different theoretical models are known, no comprehensive model exists, which have been validated empirically by means of structural analysis. The present study strived a) to formulate a confirmatory factor analytical model, which defines meta-cognitive learning strategies as well as emotional-motivational regulatory strategies as latent constructs. b) Theoretically derived associations between these components were defined and an according structural equation model was developed, which allows for the estimation of direct and indirect effects between its latent constructs. c) It was investigated, whether the properties of the structural model vary depending on school characteristics. Thus, multi-group analyses were conducted using median dichotomized 'Teachers capacity of motivating pupils' and 'Elaboration' as moderators. Empirical data are taken from a study sample of N = 1428 grammar school pupils in Switzerland, who completed a standardized questionnaire in classes. The results showed, that the structural equation model allows for an appropriate prediction of empirical associations in the whole study sample. 'Volition' and 'persistence' act as mediating variables within the postulated causal structure for all three meta-cognitive strategies. Significant difference for the path coefficients exist in dependence of 'Teachers capacity of motivating pupils' as well as for 'Elaboration'. In summary, these results show, that meta-cognitive strategies can be predicted satisfactorily by emotional and motivational components. Additionally, teaching characteristics should be considered in order to allow for a more differentiated understanding of causal processes. Thus, the results of our study may enhance the knowledge on how to arrange school contexts in order to improve the competence of self-regulated learning.

The impact of the school on student achievement, academic self-concept and their interrelation
Bieke De Fraine, Centre for Educational Effectiveness and Evaluatio, *Belgium*
Jan Van Damme, CEEE K.U.Leuven, *Belgium*

Educational researchers have been challenged to investigate the effect of the school environment on students. The present study extends the existing knowledge on school effects by investigating two student outcomes longitudinally: language achievement and academic self-concept. The interrelation between the two outcomes is described by the reciprocal effects models which acted as the theoretical framework of the study. Data were gathered through repeated assessment of 2826 students in 50 secondary schools in Flanders, Belgium. These longitudinal data were analysed by a multivariate multilevel growth curve model. The inclusion of a school level in the model makes it possible to estimate the impact of the school on (1) achievement and academic self-concept; (2) the changes in these two outcomes; (3) the interrelation between the two outcomes. It was found that schools account for about 54% of the variance in language achievement and only about 8% of the variance in academic self-concept. The school also has a larger impact on the changes in language achievement (31% for girls and 55% for boys) than on the changes in academic self-concept (15% for girls and 5% for boys). Furthermore, the results suggested that the changes in academic self-concept were not related to the changes in achievement, neither at the individual, nor at the school level. There is, however, a positive relation between academic self-concept and achievement, both at the school level and the individual level. The positive correlation at the school level is an indication of consistency of school effects. Schools that are effective for

language achievement, tend to be also effective for their students' academic self-concept. However, the magnitude of the interrelation between language and academic self-concept decreases over time.

Concentration and motivation within school context
Monika Buhl, German Institut of International Educational Resea, *Germany*

Following recent results of Positive Youth development (Larson 2005), the major aim of this presentation is to show that experiences of concentration and motivation during class time are not homogeneous and that variations could be observed depending on the nature of the learning setting and the quality of individual experience within the situation. Data is drawn from the study "School as a Developmental Context during Adolescence" where 130 7th and 8th graders and their teachers from an East-German "Regelschule" were investigated intensely during one week of school classes. HLM-Analyses for explaining concentration and motivation as outcomes of positive development show mainly effects of experiences within the concrete learning situation. Effects of teaching method are small but stable compared to the results for motivational goal orientations. Discussion will focus on the relevance of these findings for teacher education, especially on the meaning of the high impact of students experiences in concrete situations compared to general orientation styles.

Political orientations in adolescence and in adulthood – does a democratic school climate make a difference?
Urs Grob, University of Zurich, Institut of Education, Switz, *Switzerland*

Subject-specific instruction in civics is known to foster political knowledge. The hidden curriculum thesis, however, states that learning in everyday school life might be even more important for political socialization, i.e. for the development of basic political orientations and competences. One key argument is that, when encountering respect and experiencing successful cooperation with others in order to protect common interests, students will develop a sense of belonging, which encourages them to assume responsibility for the common welfare and serves as an affective basis for further political participation. Ideally, in school democratic principles can be learned "in nuce". Several studies already yielded some evidence for systematic relations between classroom climate and certain political competences and attitudes. Still, little is known about such effects on the long run. This paper is intended to shed some more light on potential influences of school and classroom climate factors on the students' political socialization not only in a short- but also in a long-term perspective. Based on data of the German longitudinal LifE-Study, single- and multilevel regression analyses are carried out to predict political interest and tolerance towards foreigners at ages 16 and 35, drawing on school and classroom climate factors. The findings confirm some consistent, albeit small, short- and long-term effects of indicators of democratic school life and of prevalent social norms in the classroom, as perceived by the students, onto both criteria variables. Most interestingly, a more democratic and less competitive social climate is positively associated with tolerance towards foreigners even 20 years later. However, all of these effects are small compared to those exerted by the family of origin and its socio-cultural and socio-economic background.

O 19
01 September 2007 08:30 - 10:30
Room: 1.71 Pócza
Symposium

The role of self-regulation in writing

Chair: **Ron Oostdam,** University of Amsterdam, *Netherlands*
Organiser: **Amos van Gelderen,** University of Amsterdam, *Netherlands*
Organiser: **Ron Oostdam,** University of Amsterdam, *Netherlands*
Discussant: **Gert Rijlaarsdam,** University of Amsterdam, *Netherlands*

This symposium explores the importance of self-regulation for writing instruction in primary and secondary education. Theories of writing processes (such as Hayes & Flower, 1980 and Bereiter & Scardamalia, 1987) define cognitive processes that writers use for attaining their writing goals. Expert writers and novices differ in this respect. For example, planning of text is a process that experts often spend a lot of attention to, whereas novices start to write without elaborating any plan at all. Writing research has made increasingly clear that good writing presupposes self-regulation for making proper decisions about the processes that deserve more or less attention at a given stage of the writing task. Given the fact that writing consists of numerous sub-processes, such as task-orientation, planning, text-organisation, formulation, lexical and syntactic processing, monitoring of text contents, evaluation and revision, self-regulation may be the most crucial determinant of successful text production (cf. Graham & Harris, 2000; Englert, 1991; Zimmerman & Risemberg, 1997). Mark Torrance et. al. will present results of a training experiment into the effects of cognitive self-regulation instruction for 6th grade students. Amos van Gelderen and Ron Oostdam will present results of instruction directed to self-regulation for foreign language writing in bilingual education (grades 10-11). Fillia Kostouli will present results of research into classroom discussions in grade 6 concerning the way by which Greek students and teachers defined and negotiated (and thus co-constructed) writing plans and strategies to be used for the production of expository and argumentative written texts. Eva Lindgren presents an exploration of keystroke-logged writing data, directed at young learners' (13 years old) revision and self-regulatory processes in L1 and L2 writing. Debra Myhill and Susan Jones present results of a study into the metacognitive understanding of children (grade 8 and 10) on revision during the text-production stage of writing.

Cognitive strategy training for writing - Does it work, and if so how?
Mark Torrance, Staffordshire University, *United Kingdom*
Raquel Fidalgo, Leon University, *Spain*
Jesus-Nicasio Garcia, Leon University, *Spain*
Patricia Robledo, Leon University, *Spain*

71 normally-functioning Spanish sixth grade students participated in classroom-based cognitive strategy training aimed at developing the quality of their written composition. Compared with controls, intervention participants showed improved text quality and a greater tendency to preplan their text. This effect was sustained at 3 months and at 28 months after the intervention. Correlational analyses suggested that immediately after the intervention tendency to preplan was a robust predictor of text quality. This effect was absent at 28 months when instead quality was better predicted by tendency to revise. Our findings suggest that strategy training has lasting

benefits for text quality, but it remains unclear whether this effect is mediated by changes in students' writing strategies or by developing their knowledge of the features of good text.

Effects of instruction in self-regulation for writing
Amos van Gelderen, University of Amsterdam, *Netherlands*
Ron Oostdam, University of Amsterdam, *Netherlands*

A series of lessons is developed for the instruction of self-regulatory skills for writing in grade 11 of bilingual (Dutch-English) education. Dutch students are given English writing assignments with instructions for regulating their writing behaviour. Each assignment is supplemented with instructions for different regulatory activities (planning, translating, evaluating, revising). An experiment with 120 students has been carried out comparing this self-regulatory training with another treatment directed at improving lexical fluency in English and a control group. Instead of the self-regulatory training, the lexical treatment contains lexical exercises. By comparing the effects of both treatments two models are tested. The first is the additive model in which instruction in lexical fluency and self-regulation have independent contributions to writing skill. The second is the conditional model in which lexical fluency is a prerequisite for an extra contribution of self-regulation. Effects are tested using six post-test writing assignments, requiring the students to write paragraphs with different purposes and in different genres. The differences between conditions on global ratings of text quality (so-called primary trait ratings) will be presented.

Co-constructing writing strategies and plans: 'Expert' and 'struggling' writers in socially mediated contexts of instruction
Triantafillia Kostouli, Aristotle University, *Greece*

This work advocates a sociocultural perspective to strategy instruction in classroom communities. Among the issues raised are: How is strategy instruction and learning mediated by the particularities of the specific classrooms (students' academic abilities, the types of writing tasks used, the activities constructed)? How does the teacher mediate curriculum knowledge on cognitive strategy instruction to students? Are there more versus less effective strategies adopted by teachers in this mediating process? How is strategic learning interactively constructed by different groups of writers? Building on the premise that meanings are collaboratively created, this study traces the trajectories teachers and students constructed while negotiating their writing tasks. Attention is directed to two different groups of, 'struggling' and 'expert', 6th grade writers in two Greek classrooms as they navigated through two different contexts. These included whole-class negotiation of a structure of strategies concerning expository and argumentative text writing (brainstorming, goal setting and text-structures) and small-group discussions (consisting of the collaborative negotiation of these strategies) which led to the production of written expository and argumentative texts. As shown, the distinction between 'expert' and 'struggling' writers is too rough and sub-distinctions need to be made between different kinds of writing expertise among the participating children. In addition, it is indicated that the route from whole-class to group discussions does not involve a transfer of a set of given strategies from the teacher to students; certain strategies are singled out and their content is shaped and reshaped by the different writing groups; 'expert' and 'struggling' writers tended to single out different strategies and arriving at new (poorer or richer) ways of co-constructing their meanings. The implications to strategic writing instruction are discussed.

More than just error correction: Children's metacognitive understanding of online revision processes
Debral Myhill, University of Exeter, *United Kingdom*
Susan Jones, University of Exeter, *United Kingdom*

Drawing on the second phase of a two year study of children's linguistic and compositional processes, this article describes children's reflections on their online revision processes, those revisions made during the process of translating thoughts into written text. The data collected was from classroom observation and post hoc interviews with 34 children, who were observed during a writing task in the English classrooms and interviewed subsequently to elicit their reflections and understandings of their own revising processes. The analysis indicates that children tend to conceptualise revision as a macro-strategy and as a task, which is predominantly undertaken as a post-textual production reviewing activity. It also indicates that children engage in multiple revising activities during writing, including many revisions, which are not concerned with simple matters of surface accuracy, and many children are able to talk about these perceptively and with insight.

The influence of text type and language on self-regulation in writing
Eva Lindgren, Umea University, *Sweden*

This paper presents a small study in which keystroke logging was used 1) to capture traces of self-regulation in writing and 2) to stimulate young writers' noticing, metacognitive awareness and self-regulatory skills in writing. Keystroke logging records writing sessions and stores accurate and detailed information about time and occurrence of every keystroke in a log file. Planning and revision of writing can be reflected as pauses, changes and movements in the text. In order to gain more information about writers' motivation from these traces, additional data collection methods, such as stimulated recall, can be used. Keystroke-logging programs include a replay function, which allows retrospective analysis of or reflection on text evolution. In this study, nine 13-year-old writers wrote and reflected on argumentative and descriptive first (L1) and second language (L2) texts. Their revision during writing was coupled with their recall of revision in a post-writing replay session. It is posited that revision reflects writers' awareness of form and concepts during writing and is an indicator of self-regulation during writing. Results indicate that both text type and language affected the young writers' revision and self-regulatory processes during writing. Further, text-type and language affected the writers' level of recall during replay, indicating that L2 as well as descriptive topics stimulate recall and discussion of form while L2 argumentative tasks or L1 descriptive tasks seem to promote conceptual discussions of writing. Finally, examples will be given of items that were recalled during the replay sessions that were later incorporated into a second draft of their texts. How the results impinge on writing pedagogy will be discussed.

P 1
01 September 2007 11:00 - 12:20
Room: 7.59
Paper Session

Assessment of competence

Chair: **Gyöngyvér Molnár,** University of Szeged, *Hungary*

Competency profiles from standard assessments
Claus H. Carstensen, IPN Kiel, *Germany*
Andreas Frey, IPN Kiel, *Germany*

Recently for Germany it was decided to set up educational standards for several subject areas and several degrees of graduation with the goal to improve student performance. These standards define educational goals in terms of competencies for each subject area and three different levels of graduation. A newly developed standard test for Mathematics grade ten is analysed, in this test the standards are organized in "big ideas" and "content related competencies". The present contribution addresses the question whether results can be reported simultaneously on five big ideas and six content related competencies of the test. The data to be analysed was collected on a second day of testing following the PISA 2006 assessment in Germany. Using Multidimensional IRT modelling for large scale assessment data, some alternatives of student competency profiles are modelled with different complexity. The paper addresses the question what differential information we get from complex competency profiles, how reliable results can be reported and how complex can profiles be reported with sufficient reliability.

Educational standards for mathematics in Germany: Results for coder reliability
Andreas Frey, Leibniz-Institute for Science Education (IPN), *Germany*
Claus H. Carstensen, Leibniz-Institute for Science Education (IPN), *Germany*

Following the mediocre German results of international large scale assessments like TIMSS, PISA or PIRLS the 16 German federal states recently decided to set up educational standards for several subject areas and several degrees of graduation with the goal to improve student performances. The standards define educational goals in terms of competencies. Whether these educational standards are met will be tested by means of standardized tests. The present contribution describes the development of a standardized test to measure the attainment of the standard in mathematics for the "medium" graduation level (mittlerer Schulabschluss), usually obtained after grade ten, with a focus on coder reliability. Based on a faceted theoretical competency model an item set was developed and field tested as a national extension of PISA 2006 (N = 12000). Nearly half of the 313 items were open ended, so that the students' answers have to be coded before statistical analysis. Therefore 14 markers were trained on basis of a standardized coding guide. To ensure reliable measures the consistency of codes given by all coders for 180 responses to each of the open ended items was examined within a generalisability theory framework. The observed variance was decomposed into variance components for three main effects (Student, Coder, Item), three first level interactions (Student x Item, Student x Coder, Coder x Item) and a residual (including the second order interaction). The results show that the observed variance can mostly be explained by effects that incorporate the variables Item and Student while the variance components where coders are involved are negligibly small. Thus, there is no systematic coder effect and

therefore the given codes can be interpreted independently of the coders. Advantages of using generalisability theory to examine coder reliability are discussed in contrast to other approaches.

Development of English can-do framework and its application to high school English classes
Naoyuki Naganuma, Seisen University, *Japan*

Recently the Common European Framework of Reference for Languages has increased its popularity in Japanese English language educational context. Can-do scales or items are becoming more and more important as indicators of current English abilities of learners which are not understood directly from test scores. However there are still few attempts by teachers to use can-do scales in their language classrooms or create can-do items which reflect their teaching practices. In this presentation, three related studies are reported, in which an English can-do framework has been developed and applied to high school English language classrooms. In the first study, the current attempt to construct common English can-do framework at Seisen University is reported. Seisen Academic Can-Do Framework is based on the can-do statements, which have been developed for the research on the English curriculum reform at our university. In the second study, an undergoing research project to apply Seisen Academic Can-Do Framework to English classes at eight public high schools in Saitama prefecture is presented. In the third study, the result of SELHi (Super English Language High School) research project at Kasumigaoka High School is shown as a case study of a localized can-do framework.

P 2
01 September 2007 11:00 - 12:20
Room: 0.87 Marx
Paper Session

New modes of assessment

Chair: **Tibor Vidákovich,** University of Szeged, *Hungary*

Formative and summative assessment relationships: synergies or constraints?
David Carless, University of Hong Kong, *Hong Kong*

The potential of formative assessment for enhancing student learning is now well-recognised but a key challenge remains the influence of summative assessment. If formative assessment (also known as assessment for learning) is to flourish, initiatives aimed at supporting a positive link between formative and summative assessment functions are sorely needed. This paper explores potential synergies between formative and summative assessment at a conceptual level and at the level of practice. The main aims are as follows: To identify existing good practices at the interface of formative and summative assessment and support the further development of these practices; To examine under what circumstances summative assessment acts as a barrier to formative assessment and under what circumstances it can be supportive. The paper is exploratory in nature and draws on qualitative data from an ongoing project in Hong Kong primary schools. This project, Primary English Assessment for Learning (PEAL), involves in-depth case studies, three of which form the basis of this paper. The essence of the research method is to explore assessment for learning practice through semi-structured interviews, classroom observations and documentary analysis. The main findings to date relate to teachers' conceptions of learning and assessment; the

potential of 'test paper review' and 'consolidation days' to enhance learning after a test; and the tensions stimulated by an external examination taken by year 3 and year 6 students. The significance of the paper relates to its contribution to assessment theory in terms of the exploration of synergies between formative and summative assessment. The paper also carries implications for the development of a context-sensitive version of formative assessment. In other words, where testing is frequent and pervasive negative impacts may be reduced if appropriate follow-up learning interventions are carried out after a test is taken.

When policy didn't meet practice - formative assessment in the Secondary classroom.
Doreen Spiteri, University of Malta, *Malta*
Pamela Sammut, Sacred Heart Minor Seminary, *Malta*

A national policy for a renewed emphasis on formative assessment prompted this study into the assessment practices of teachers in a secondary school. The policy came about to offset the narrow forms of assessment and testing that currently characterize school-based assessment in Malta. The literature on Formative Assessment also played an important role in spearheading this move away from testing as the only recorded form of assessing students' progress. In the light of this renewed attention to teachers' assessment practices, a study was conducted to explore a school's assessment practices, in particular, it focussed on the four teachers of English in a small boys' secondary school. Systematic classroom observations were carried out using an adapted model of Torrance and Pryor's observation checklist of assessment practices. This was followed up with interviews intended to explore teachers' views and beliefs on assessment, and in particular, formative assessment. The observations and interviews strongly suggest that summative assessment still dominates classroom assessment practice although teachers reported a desire for a culture change in assessment, which places the students at the centre of the learning process.

Assessing computer literacy using simulated and real world tasks
John Ainley, Australian Council for Educational Research, *Australia*
Julian Fraillon, Australian Council for Educational Research, *Australia*
Chris Freeman, Australian Council fro Educational Research, *Australia*
Juliette Mendelovits, Australian Council for Educational Research, *Australia*

The importance of ICT proficiency is steadily increasing in modern society and there is ever increasing interest in its assessment. This paper discusses the development and properties of a computer-based assessment of ICT literacy that seamlessly combined questions to assess knowledge and understanding, performance of specific functions within software simulations and creation of products using live applications within a rotated set of thematic modules. Typically, students collected and appraised information and then synthesised and reframed it. The assessment was administered to a nationally representative sample of nearly 7,400 Australian students in Year 6 and Year 10 from 520 schools. The paper discusses issues concerned with the design and delivery of computer-based assessments that incorporate standard test questions, simulated skill assessments and authentic tasks using actual applications in controlled conditions. The paper discusses issues associated with the development of a reliable scale across a set of rotated modules that incorporate simulated and authentic tasks and the interpretation of that scale in terms of what students can do. In addition it reports on an analysis of variations associated with differences among students in terms of year level, background characteristics and patterns of computer use.

The effects of hands-on experience with new modes of assessment on students' preferences
Katrien Struyven, KULeuven, *Belgium*
Filip Dochy, KULeuven, *Belgium*
Steven Janssens, KULeuven, *Belgium*

This study investigates the effects of hands-on experience on student teachers' preferences for assessment methods. A course on Child Development within the first-year of the elementary teacher education program provides the quasi-experimental learning/teaching setting. Five research conditions are linked to four assessment modes, namely: portfolio, case-based, peer assessment and multiple choice evaluations. Data collection was obtained by questionnaires, adopting a longitudinal design that involves three moments of measurement (N=669). Results show initially negative responses to unknown assessment methods. As familiarity with the assessment tool grew, students' preferences changed positively. Though the extent differs, every assessment method benefited significantly from hands-on experience with the format. Moreover, students' perceptions of the appropriateness of the assessment method for evaluation purposes are congruent with the students' preferences. Consequently, in order to change students' preferences for unknown assessment methods, hands-on experiences are fundamental and need to be positive. Results are particularly encouraging for teacher education instructors who use a variety of assessment modes. Note: Tables and Figure (and Reference-list) are attached.

P 3
01 September 2007 11:00 - 12:20
Room: -1.62
Paper Session

Culture and education

Chair: **Edina Caprez-Krompák,** University of Zurich, *Switzerland*

Team learning: The influence of social and cognitive factors
Piet Van den Bossche, Maastricht University, *Netherlands*
Wim Gijselaers, Maastricht University, *Netherlands*
Mien Segers, Leiden University, *Netherlands*

A team is more than a group of people in the same space. In recent years, increasing attention has been devoted to the social bases of cognition whereby research on information processing and its consequences for professional decision-making has taken into consideration how social processes in groups and teams affect performance. This chapter investigates when and how teams in collaborative learning environments engage in building and maintaining mutually shared cognition, leading to increased perceived performance. In doing so, this research looks for discourse practices managing the co-construction of mutually shared cognition, and reveals conditions in the interpersonal context that contribute to engagement in these knowledge building practices. A comprehensive theoretical framework was developed and tested. Data were collected through three empirical studies in educational and organizational setting. Results showed that both interpersonal and socio-cognitive processes have to be taken into account to understand the formation of shared mental models, resulting in higher perceived team performance.

Culture differences and cognitive explanations of a natural phenomenon - a case study of Israeli Bedouin Children.
Orit Ben Zvi -Assaraf, Ben Gurion University of the Negev, *Israel*
Alamour Yousif, Ben-Gurion University of the Negev, *Israel*

Recent developments in concept learning and in science-for-all curricula have stimulated our interest in comparing children's culture and cognitive explanation of a natural phenomenon. This study compares the alternative frameworks regarding the water cycle, of fourth grade children, from a Bedouin settlement and a village in Israel. Sixty four children were asked to draw "what happens to the water in nature"? Later doing interviews, all students were requested to elaborate on their drawings and responses to the Repertory Grid technique regarding the "Water in nature". The results substantiated the influence of the Bedouins traditional and religious way of life on students` perceptions. Results revealed some striking similarities and interesting differences between attitudes of children towards water natural phenomena. During the elementary grades, children build understanding of water related concepts through direct and concrete experiences with earth spheres, and their natural environment. These findings are discussed in relation to the respective challenges, facing science teachers with regard to teaching science in a science-for-all curricula.

Cooperative learning between East and West: culturally appropriate instructional design principles for solving cultural conflicts and mismatches
Mai Nguyen Phuong, University Utrecht, *Netherlands*
Cees Terlouw, University of Twente, *Netherlands*
Albert Pilot, University Utrecht, *Netherlands*

The mere application of cooperative learning models in schools in Asian countries with a Confucian Heritage Culture (CHC) background (e.g. Viet Nam) run into serious problems; cooperative learning is in the end not implemented and abandoned. A main reason is the cultural conflict and mismatch between the Western assumptions underlying cooperative learning, and the norms, values, and educational practices connected with a Confucian Heritage Culture. Based on a comparative analysis of this conflict 26 culturally appropriate instructional design principles were formulated to foster cooperative learning applied for Asian learners. This research focuses on a formative evaluation of these 26 CHC-principles in a school for secondary education in Viet Nam. A 'reversed treatment equivalent group design with post-test only' was applied with an experimental group (n=48) that executed five cooperative learning tasks based on the culturally appropriate ID-principles, and a control group (n=48) that executed five comparable cooperative learning tasks based on Western ID-principles. Various methods of data gathering were employed to make triangulation possible for evaluating the implementation, social en cognitive effects of the application of the two series cooperative learning tasks designed. The research concerned two phases: (1) training of teachers and students of experimental and control group with 'trial tasks'; and (2) teachers' delivery of the small group cooperative learning tasks to the experimental and control group. Twenty CHC principles could be implemented. The social and cognitive effects were generally better in the CHC experimental group than in the control group. The 'cultural condition' must be taken into account when designing instruction for cooperative learning in Asian countries in which the Confucian Heritage Culture is characteristic.

Dialogical teachers. Narrative and dialogical construction of professional identity of Italian teachers
Maria Beatrice Ligorio, University of Bari, *Italy*
Luca Tateo, University of Salerno, *Italy*
Giovanna Ammaturo, Universty of Salerno, *Italy*

The present study investigates the narrative and dialogical construction of professional identity in a group of Italian teachers and its relationship with teaching practices and school context. Theoretical framework has been implemented by the fertile intersection of Hermans' Dialogical Self theory, Bruner's narrative approach, and Beijaard teacher professional identity dimensions. Teachers' professional identity has been analysed through a semi-structured interview administered to 27 Italian teachers, teaching at different school levels and different curricula. Interviews were audio-recorded, transcript, and analysed by two researchers independently. A qualitative analysis was performed looking for themes based on the literature. In particular, we searched for the narrative reconstruction of everyday events, significant others, turning points, and educational practices, looking in particular for the overall meaning and the coherent sense teachers attribute to these events. Results show mechanisms of teacher professional identity and representation of teaching formation and development. Such processes are influenced by relationships with the students, families, school organisational culture, principals and colleagues, as well as technology, personal biography and, ultimately, society.

P 4
01 September 2007 11:00 - 12:20
Room: -1.64
Paper Session

Developmental aspects of instruction

Chair: **Erzsébet Korom,** University of Szeged, *Hungary*

Embroideries, chain stitches and embodied inquiry: Being instructed in handicraft
Oskar Lindwall, Göteborg University, *Sweden*
Anna Ekstrom, Stockholm Institute of Education, *Sweden*

The school subject sloyd – which includes textile craft, woodwork and metalwork – is obligatory in Swedish compulsory school. With a focus on interaction, instruction and "competencies as demonstrable courses of inquiry with distinctive materials at hand" (Lynch, Livingston & Garfinkel, 1983, p. 207), this study analyses two episodes from teacher education programs that specializes in sloyd. While the educational research community has seen an increased interest in interaction and the practical work of providing and following instructions, especially in domains such as science and mathematics, few studies address the interactional work of teaching and learning handicrafts. Although the school subject sloyd might seem exotic and peripheral, we hold that the analyses concern a wider audience than those with an explicit interest in handicrafts. More specifically, by being exhibits of sloyd education and not, for instance, history or mathematics, the two episodes are particularly suited to bring forth certain issues that concern instruction and education in general. These issues include: a) the distinction between listening to a lecture and listening for what one needs in order to continue with an activity; b) if and how an example can be

an example of something before one knows what this something is; c) the problems of "just mimicking" what someone else is doing; and, d) how a novice makes visible those specific competencies that he or she lacks and how the teacher address these competencies in and through her instructions.

Syllabus, what does it say? Identifying and characterizing interactions between syllabus writers to addressee in Israeli teacher education colleges
Dita Fischl, Kaye College, *Israel*

Abstract The aim of this study was to characterize syllabuses in Colleges for Teacher Education in Israel by examining interactions between the syllabus writer (who also teaches the course), the students and the college. The study is descriptive and the leading orientation is qualitative combined with mixed methods. The main findings showed that the amount of clarity, explanation, detail and transparency in the analyzed syllabuses , represented the interaction between the lecturer and students; the more the syllabus was detailed and explanatory it was better adapted to adult students; and the syllabus format (designed by the college) was found to influence the two former findings. Hence, it seems that the syllabus in teacher education colleges is situated on the cross roads of central actions that may illuminate important processes in teaching, learning and college culture.

Risk profile in multiracial adolescents and impacts on educational outcomes
Stephen Whitney, University of Missouri-Columbia, *USA*
Elise Robeson, University of Missouri-Columbia, *USA*

Previous studies of resiliency have assumed multiracial children to be a homogenous group, without looking at the unique dynamic that children may experience when belonging to distinct racial groups. This study attempts to alleviate this by examining, do multiracial adolescents differ in the amount of risk factors they face and later educational outcomes based on their unique racial background? Participants and Procedures Data was taken from The National Longitudinal Study of Adolescent Health. Individuals who identified as multiracial were examined in terms of their unique racial backgrounds and five distinct racial groups were identified. Items identified by the empirical literature as risk were used in the analysis. Outcome measures included educational attainment and number of expulsions. Because adolescents were sampled longitudinally, missing data was imputed using the EM algorithm method. Factor analysis was used to identify items that factored together for both risk and outcome measures. Distinct multiracial group along with single race group means of risks and outcomes were analyzed and compared using a one-way ANOVA post-hoc test. Results Preliminary analysis of the data suggests that several differences exist among racial groups, both single and multiracial, in terms of risk factors and outcome variables. Every risk factor identified within the study, along with the majority of outcome measures, had significant differences among racial groups. It is evident that a number of differences occur among single race groups, between multiracial groups and between single and multiracial groups. Conclusions Preliminary analysis results conclude that differences exist among racial groups, both single and multiracial participants, which highlights the need for examining children based on their unique racial status. Further analysis will include structural equation modeling and the creation of a cluster analysis to determine how certain risks cluster to form latent outcome variables.

Developing potentials for learning electricity and physics in the Israeli higher education: combining computerized simulation and animation in teaching
Naftaly Dov, Technion, Haifa, *Israel*

The purpose of this study was to examine ways to improve and advance the potentials for learning electricity and physics in higher education by combining computerized simulations and animations in the teaching. Qualitative and quantitative methods of research were combined in this study. An innovative observation model used to conduct observations in physics classes. The participants were Technion's (Israel Institute of Technology) undergraduate students (N=66) in the physics department and their teachers. Questionnaires were given to students and teachers. An anonymous attitude questionnaire was given to students to determine their views and perceptions about computerized simulations and animations. Data from students and teachers was gathered through semi-structured interviews. In my presentation I will detail the findings relate to the main advantages and disadvantages of computerized simulations and animations as teaching aid in higher education and implications of combining computerized simulation and animation in learning and instruction processes to developing potentials for learning electricity and physics in the Israeli higher education.

P 5
01 September 2007 11:00 - 12:20
Room: -1.63
Paper Session

Educational effectiveness

Chair: **Heinz Mandl,** University of Munchen, *Germany*

Teaching reading strategies to students with reading disabilities: The impact of instructional quality
Faye Antoniou, University of Thessaly, *Greece*
Elmar Souvignier, J.W. Goethe University, Frankfurt, *Germany*

Teaching reading strategies is perceived to be a powerful approach towards fostering reading competence, especially for students with reading disabilities. However, the role of the teacher has been discussed only rarely within research. The aim of our study was to analyse the impact of teachers' instructional behaviour on students' learning gains. Hence, all teachers were provided with the same strategy-oriented program in order to minimize the influence of the lessons' content. The program "Becoming a reading-detective" was implemented to 14 fifth to seventh-grade classrooms. This 29-lesson program aims at enhancing reading competence through teaching four reading strategies and one metacognitive strategy. The outlined lessons were presented as general guidelines where the educators could adjust their personal way of teaching in order to correspond to the students' reading level. During an academic year's period, students' learning gains in reading strategy knowledge were assessed within a pre-, post- and follow-up-test design. Quality of instruction was assessed by repeated classroom observation. In particular, classroom management, structure, motivational quality and application of programs' principles were rated by skilled observers. Results prove that the effectiveness of teaching reading strategy depends largely on the instructional quality. Correlations between mean learning gains from pre- to posttest count

up from r = .54 (structure) over r = .59 (classroom management) to r = .72 (motivational quality) and r = .72 (application of programs' principles). Correlations between instructional quality and learning gains from pre- to follow-up test remain about the same, indicating a strong long-term impact of teaching behaviour. Findings prove that explicit, structured instruction is beneficial for teaching reading strategies to students with reading disabilities. Moreover, high motivational quality and frequent application of programs' principles seem to be necessary conditions for a successful implementation of strategy-oriented reading programs.

Are guided cognition learning advantages the result of novelty?
William B. Whitten II, Fordham University, *USA*
Mitchell Rabinowitz, Fordham University, *USA*
Sandra E. Whitten, Fordham University, *USA*

Our focus is on learning in unsupervised environments (represented by most homework). Guided Cognition structures study tasks to guide the learner to engage in specific, observable cognitive events. These events are hypothesized to elicit underlying theoretical cognitive processes that have been shown to improve learning. Initial Guided Cognition experiments found performance on an unexpected, three-day delayed quiz to be 21 and 18 percentage points better after Guided Cognition (GC) homework than after Traditional (T) homework, for average and advanced English literature students, respectively (Whitten, Whitten, & Rabinowitz, 2006). Subsequent experiments determined this advantage was due neither to differences in time spent on the two forms of homework, nor to teaching that preceded the homework (Whitten, W. B., II, Rabinowitz M., and Whitten, S. E., 2006a, 2006b). The current experiments were performed to determine whether the Guided Cognition learning advantage was durable, or whether it was due to novelty and would fade with repeated exposure. Average and advanced ability high school English literature students read Shakespeare's Macbeth. Five T homework questions and five corresponding GC homework questions were prepared for each of Acts III and IV. The cognitive events used in the GC homework questions were: relate to prior experience; illustrate visually; consider divergent answers; role play; conceptualize, theorize, and brainstorm. A quiz was constructed to test the Act III and IV content and was given without prior announcement after a three-day delay. Results of average and advanced ability students showed a consistent advantage for Guided Cognition after repeated exposure, thus ruling out an explanation that the effect is due to novelty. These results imply that Guided Cognition can be used frequently without loss of effectiveness.

„I trust you vs. we trust each other". The nature of trust at multiple levels of analysis and its impact on innovative behavior and job satisfaction.
Nienke M. Moolenaar, University of Amsterdam, *Netherlands*
Peter J.C. Sleegers, University of Amsterdam, *Netherlands*
Sjoerd Karsten, University of Amsterdam, *Netherlands*

In educational research, multilevel questions are nowadays addressed by a wide array of statistical multilevel techniques. However, theories on the multilevel nature of educational concepts have received little attention. Recent literature shows that the nature of multilevel variables can differ across levels of analysis. The aim of this study was to examine the validity of the concept of teacher trust at multiple levels of analysis, and to test a conceptual framework of the impact of teacher trust on innovative behavior and job satisfaction across levels. First, we show that the concept of teacher trust differs across levels (individual versus team trust). Second, a comparison of individual level relationships between trust, innovative behavior and job satisfaction with

analogous relationships on the school team level demonstrates that, at multiple levels of analysis, teacher trust has dissimilar relationships with innovative behavior and job satisfaction. These findings suggest that the traditional assumption of homology (consistency between relationships among variables at one level and analogous relationships at another level) of the concept of teacher trust has to be revisited. Finally, theoretical and practical implications and directions for future research are discussed. This study contributes to the recent discussion on multilevel theories of homology.

How researchers and practitioners think about the relation between educational research and practice
Hein Broekkamp, University of Amsterdam, *Netherlands*
Bernadette Van Hout-Wolters, University of Amsterdam, *Netherlands*

According to many researchers and practitioners (e.g., teachers, education policy makers, designers of curricular materials) a gap exists between educational research and practice. Although these critics agree about the possibility and necessity to improve the connection between research and practice, they are intensely at odds about the ways in which the presumed gap should be bridged. Instead of representing a specific current in the debate and defending solutions accordingly, we have developed an inventory of the problems, causes and solutions that have been brought forward in the literature – opinion articles and advisory reports that appeared in and outside the Netherlands. The aim of our review is to contribute to a lucid, thorough and encompassing problem analysis, which enables participants of the debate to take in a broad perspective when defending their positions and taking actions to improve the connection between research and practice in education. At the conference, we present this review. In addition, we present results of a questionnaire, which we have based on the review and administered to 160 persons, most of them participating on a Dutch symposium that was organized in 2006 about the relation between educational research and practice. Our sample was very diverse, including researchers and non-researchers (participants who qualified themselves foremost as teachers, policy makers, teacher trainers and developers of educational materials). Remarkably, these two groups, on average, converged concerning the problems and causes that they identified as constituting the research-practice gap. Still, within both groups there were large differences of opinion.

P 6
01 September 2007 11:00 - 12:20
Room: 0.81 Ortvay
Paper Session

Learning styles, perceptions of self-as-learner

Chair: **Andreas Demetriou,** University of Cyprus, *Cyprus*

Jan Vermunt's Inventory of Learning Styles in Polish higher education settings
Ewa Czerniawska, Warsaw University, *Poland*

The paper presents two investigations. The aim of the first one was the construction of the Polish version of Jan Vermunt's "Inventory of Learning Styles". The procedure and the results of the

Polish adaptation of the Jan Vermunt's „Inventory of Learning Styles" are presented. At the beginning the procedure consisting of three independent translations of the English version, authorized by J. Vermunt, which were the basis of the version subject to back-wards translation is described. The final version was filled in by 243 students from three different faculties of the Warsaw University: Education, Law and Mathematics, half from the second, and half from the fourth year. The analyses showed that most scales had acceptable reliability. Higher coefficients were found in the whole group than in sub-groups. The results were differentiated more by the faculty than by the year of study. Relations between scores in „Inventory of Learning Styles" and GPA were also analyzed. The overall conclusion of the study was that the Polish version of the ILS might be a useful tool in educational research. A second investigation was conducted with 62 students from the second and fourth year of the Faculty of Electronics, Warsaw Polytechnic School in order to check whether learning styles are differentiated in younger and older students. The results showed that the application-directed style was dominating in older students, whereas meaning-directed in younger. The undirected learning style was correlated with lower achievements. The discussion is focused on the influence of educational and cultural settings in the formation of learning styles.

Learning to Learn in schools: How do pupils think about their learning?
Kate Wall, Newcastle University, *United Kingdom*
Steve Higgins, Durham University, *United Kingdom*

This paper will explore data on pupil views of learning to learn collected across the three year Learning to Learn Phase 3 Evaluation (Higgins, Wall et al. 2006). The data was collected by teachers as part of their action research projects using pupil views templates (Wall and Higgins 2006). This paper will explore the method of pupil views templates (Wall and Higgins 2006), describing their use and the rationale and theoretical basis for their design. It will then go on to discuss the analysis frame, which combines the work of Moseley et al. (2005) and Veenman and Spans (2005), used to produce investigate the way in which learning to learn pupils' views of cognitive skills are seen to overlap with their thinking about metacognition. (This will be a further development of the work presented at the EARLI metacognition SIG conference in July 2006, incorporating feedback from the conference participants.)

Helping students extend their repertoire of learning strategies - The role of student's expectations of assessment tasks
Gerrit Hirschfeld, University of Münster, *Germany*
Ruth E. von Brachel, University of Münster, *Germany*

The study reported here investigates how students develop the wide range of learning strategies senior students use to prepare for exams. One line of research suggests that student's perceptions of assessment influence students' approaches to learning. As the assessment tasks vary between undergraduate and graduate exams, the question arises in how far these changes in assessment practices might influence the development of learning strategies. Accordingly we first expected that students' learning strategies are determined by both, their previous experience with university assessment and their expectations of particular assessment tasks. Secondly we anticipated that part of the influence of experience on learning strategies is mediated by a change in expectations. In total 209 university psychology students in their second to tenth semester participated in this study. They responded to a newly developed Students' Expectations of Assessment Tasks (SEAT) questionnaire which measures students' expectations of five common assessment tasks (recalling facts, reporting studies, explaining diagrams, contrasting different perspectives, developing an own

opinion) and indicated their planned study strategies. According to our assumptions, we found a significant impact of study experience on strategy use, with senior students using a greater variety of strategies. We also found that two SEAT scales contrasting different perspectives and developing an own opinion both were able to predict how many strategies students use. A mediator analysis revealed that these two factors also mediate some of the impact of experience on the development of learning strategies. Results are discussed in the context of students' development of learning strategies.

Mirror mirror on the wall: Transforming perceptions of self -as- learner through critical self-reflection

Julie Willans, Central Queensland University, *Australia*
Jenny Mcdougall, Central Queensland University, *Australia*
Roberta Harreveld, Central Queensland University, *Australia*

Mirror, mirror on the wall: Transforming perceptions of self-as-learner through critical self-reflection Critical self reflection, though a potentially uncomfortable and even painful process for some, can be instrumental in changing perceptions of self-as-learner. When adults are given the opportunity to reflect on themselves as learners, there is scope for increased confidence, and ultimately, enhanced learning potential. According to Cranton's (2002) concept of perspective transformation, critical self reflection entails the scrutiny of assumptions, their origins, the consequences of retaining them, and why they are important. Cranton (2002) argues that the process of articulating these assumptions is integral to this process. This paper examines the 13 week learning journey of a small group of adults as they engaged in a pre-university preparatory program. Using categorical analysis to analyse data from a series of individual and group interviews, findings from this study show how the practice of self-reflection was instrumental in transforming their beliefs about themselves, and, in so doing, developing their potential for learning. Not only could they describe how they had perceived themselves, in some cases they could articulate the reasons why they had held these assumptions and how these beliefs had changed over time. Even when students could not analyse their self-perceptions to this degree, the language they used to describe themselves became more positive. Findings from this study suggest that the process of critical self-reflection is an integral part of perspective transformation for some learners. Thus, when educators plan for transformation by giving students opportunities to engage in critical self-reflection, enhanced learning potential is possible.

P 7
01 September 2007 11:00 - 12:20
Room: 7.14
Paper Session

Motivational, social and affective processes

Chair: **Anastasia Efklides,** Aristotle University of Thessaloniki, *Greece*

Cypriot students' perceptions of Modern Greek learning environment and self-efficacy in one secondary school
Elias Avramidis, University of York, *United Kingdom*
Samantha Pilava, University of York, *United Kingdom*

Research was conducted on associations between students' perceived classroom learning environment and academic self-efficacy in Modern Greek classes. A sample of 469 students from one urban secondary school in Cyprus responded to a 40-item instrument that assessed 5 dimensions of Modern Greek classroom environment (viz. Involvement, Investigation, Cooperation, Equity, and Differentiation). These scales were taken from a recently developed instrument, the Outcomes-Based Learning Environment Questionnaire (OBLEQ). Another 8-item scale adopted from the Motivated Strategies for Learning Questionnaire (MSLQ) assessed students' academic efficacy for learning and performance in Modern Greek-related tasks. Following examination of the instruments' psychometric properties, the analysis revealed statistically significant and positive correlations between all classroom environment dimensions measured and the students' reported academic efficacy. Although past performance was found more strongly correlated with self-efficacy than the five OBLEQ scales, a regression analysis revealed that the latter accounted for a substantial variance of academic self-efficacy beyond that attributable to their past performance. Students' responses to an open-ended question eliciting their preferences for modifying their Modern Greek classroom environment included suggestions regarding their lessons' structure, content, materials used, and style of delivery, along with enhanced opportunities for involvement and participation. The implications of these findings for improving educational practices in Modern Greek classes in Cyprus are discussed alongside with directions for further research in field of learning environments.

The influence of immediate feedback on subsequent learning in children
Andrea Anschütz, Universität Oldenburg, *Germany*
Barbara Moschner, Universität Oldenburg, *Germany*

Following the unsatisfying results of German students in international assessment studies (e.g. PISA) one political reaction in Germany was the development and implementation of central standards of education. To enable and support students to develop the competencies asked for in these standards, contents and methods of teaching and learning will have to be reflected and enlarged and means that either foster or hinder the individual students´ development of understanding and competencies will have to be identified. An important debate in educational research on effective learning is for example the question whether errors should be corrected immediately. Although it is quite plausible that we need feedback about our mistakes in the learning process, it is also conceivable that emotional consequences of feedback might interfere with future learning. In this study we investigated the role of immediate error feedback on subsequent learning in children with an associative learning paradigm consisting of encoding-

retrieval-feedback trials. We tested a larger sample of 200 children aged 10 to 12 years in their schools and combine the data of the learning tasks with data about individual differences (like intelligence, alertness, memory capacity, frustration tolerance, self-concept etc). This enables us, to find out more about the role of feedback in learning tasks when other possible influences on achievement are taken into account. Preliminary results show that positive or negative feedback has different consequences for different types of persons. The expected knowledge can be used for the design of further research studies about errors and feedback in relation to developmental processes of different competencies. Additionally the research based development of individualized means for teaching and learning for students and teacher education will be another important task for the future.

High-brow cultural activities of students – the effects of parents, peers and the intrinsic value of the activity

Stephan Kroner, Universität Erlangen-Nürnberg, *Germany*
Oliver Dickhäuser, Universität Erlangen-Nürnberg, *Germany*

Why do pupils spend leisure time for high-brow cultural activities? Previous studies have demonstrated that people with higher scores in openness and artistic interests have higher scores in cultural activities (Krßner et al., 2006; cf. Costa & McCrae, 1992; Holland, 1979). However, proportion of variance explained by these variables was low. Based on theory of planned behavior, in this study, beyond a replication of the effects of openness and artistic interests, two additional variables are explored as predictors of cultural activities: the "intrinsic value of the activity" and "perceived attitudes of parents and peers" (cf. Ajzen & Madden, 1986). N=100 students from grade 12 of a german gymnasium were assessed. As predictors, openness, artistic interest, intrinsic value of high-brow cultural activities and perceived attitudes of parents and peers were assessed. As criteria, data on two variables were collected: First, it was assessed, whether students participated at extracurricular activities at school, e.g. in the choir, the orchestra and the big band of the school; second, data on leisure time cultural activities were collected, i.e. the frequency of going to the opera, the theatre or museums and arts exhibitions. Results replicate the finding that participants with higher scores in openness and artistic interests are more likely to participate in both extracurricular and leisure time cultural activities. However, it could be shown that these effects are mediated by the intrinsic value of the cultural activities. Concerning effects of perceived attitudes of parents and peers on cultural activities, results were mixed: While for extracurricular cultural activities these effects were mediated by intrinsic value of the activity, for leisure time cultural activities there was a direct effect of perceived attitudes of parents and peers. It is discussed, which aspects of cultural activities determine whether there are direct effects of perceived attitudes of parents and peers.

P 8
01 September 2007 11:00 - 12:20
Room: 0.79 Jánossy
Paper Session

Motivation

Chair: **Sanna Järvelä,** University of Oulu, *Finland*

The influences of classroom context on educational resilience
Bridget Ammon, University of Michigan, *USA*
Elisabeth De Groot, University of Michigan, *USA*
Stuart Karabenick, University of Michigan, *USA*

This study explored the effects of teacher support, academic press, and classroom mastery focus on students' motivation and mathematics achievement. These effects of the classroom context were framed as potential protective factors in promoting resilience among at-risk SES and ethnic groups (Gutman, Sameroff, & Cole, 2003). Vietnamese, Hispanic, and Caucasian students (n = 644) in grades 7 through 9 participated in the present study. Student ethnicity was found to be a better predictor of math achievement than SES. Hispanic and Caucasian students were the most at-risk in our sample. Among all students, classroom mastery focus predicted student motivation, which in turn predicted changes in math achievement over the course of an academic year. Among the at-risk groups, teacher fairness and respect additionally predicted student motivation. Overall the results indicate that aspects of the classroom can operate as protective factors for motivational resilience, and the importance of motivation as a mediator between context and changes in achievement.

The Effects of autonomy-supportive teaching on students' perceived autonomy in learning and academic functioning: An examination of Self Determination Theory among various SES groups, different ages, boys and girls
Haya Kaplan, Kaye Academic College of Education and Ben Gurion, *Israel*
Avi Assor, Ben Gurion University of the Negev, *Israel*
Guy Roth, Ben Gurion University of the Negev, *Israel*
Yaniv Kanat-Maymon, Ben Gurion University of the Negev, *Israel*

According to SDT teachers should support students' need for autonomy (Deci & Ryan, 2000). Despite recent advances there are still a number of gaps in the evidence demonstrating the importance of teachers' support for students' need for autonomy. This study provides data bearing on three questions: 1) Does autonomy supportive teaching lead to students' perceived autonomy in learning and academic functioning irrespective of students' SES, their gender or age? 2) Do perceptions of autonomy support promote engagement and achievement by gratifying students' need for autonomy? (What is the mediating, need-related, experience? 3) Do we get effects of autonomy supporting teaching at both the within and the between classroom levels? Participants were 850 Israeli students in grades 3-11, from five schools. Students completed questionnaires at two time-points in the first half of the year. Then, in February teachers rated students' engagement in learning and reported students' grades. The scales were developed and validated by Assor and his colleagues (Assor et al., 2002) and were based, in part, on Ryan and Connell (1989). Reliability coefficients ranged between .77 and .90. An HLM analysis (Lee, 2000) was conducted. Autonomy support by teacher had positive effects on perceived autonomy, engagement and

achievement. Those findings were obtained across different SES groups and gender, as well as in the adolescent students. Almost all the positive effects of autonomy support were obtained at both the within and the between levels of analysis. Also, the effect of autonomy support on engagement and achievement was mediated by perceived autonomy in learning. Overall, the results suggest that autonomy is important also for people who do not belong to dominant social groups. The findings are consistent with the conception of the need for autonomy as a universal human propensity.

Motivation and self-regulation on task level: development of a questionnaire
Hendrien Duijnhouwer, Utrecht University, *Netherlands*
Karel Stokking, Utrecht University, *Netherlands*

This paper reports on the development of a questionnaire measuring writing task motivation and self-regulation. Based on an existing questionnaire with items on course level (MSLQ; Pintrich, Smith, Garcia & McKeachie, 1993) items were formulated concerning university students' motivation for and self-regulation of performing a specific writing task. With respect to motivation we measured intrinsic goal orientation, extrinsic goal orientation, self-efficacy, task value and test anxiety. With regard to self-regulation we measured metacognitive self-regulation, time & study environment management, effort regulation, peer learning and help-seeking. The questionnaire was administered in three groups of students (participating in two psychology courses and one pharmacy course at Utrecht University), concerning five writing tasks in total. Exploratory factor analysis showed that the original scales could not be maintained. Based on the scree criterion and interpretability we extracted three motivation and four self-regulation factors. The motivation factors concerned students' focus on learning, their focus on assessment and their self-efficacy. The self-regulation factors concerned students' regulation of learning together with other people, regulation of effort and attention, and students' control of the quality of their work. The results of the exploratory factor analysis will be checked with a confirmatory factor analysis. We will explore correlations between scales and compare mean scores between the three student groups. In our presentation we will go into the results of this analysis and the further refinement of the questionnaire. References Pintrich, P.R., Smith, D.A., Garcia, T, & McKeachie, W.J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). Educational and Psychological Measurement, 53, 801-813.

Fear of failure and acceptance of mistakes: Cross-cultural comparison
Ayumi Tanaka, Doshisha University, *Japan*
Andrew Elliot, University of Rochester, *USA*

It has been found that people in collectivistic cultures are high on avoidance motivation, such as avoidance goals and fear of failure, compare to those in individualistic cultures (e.g., Elliot, Chirkov, Kim, & Sheldon, 2001). The purpose of this study was to find the underlying variables behind this cultural difference. It was hypothesized that lower acceptance of mistakes was closely related to fear of failure, and thus higher fear of failure among collectivists would be explained by their lower tendency to accept mistakes relative to individualists. Since it has been reported that collectivists tended to adopt an incremental theory of ability much more than individualists, the relations between incremental theory and both acceptance of mistakes and fear of failure were also investigated in this study. Participants in this study were 135 Japanese and 215 American undergraduate students. They completed a questionnaire that included a fear of failure measure (Hagtvet & Benson, 1997), a new four-item measure assessing acceptance of mistakes (e.g., "I am able to forgive myself for my mistakes"), and an incremental theory of personality measure

(Dweck, 1999). Results provided support for the hypotheses. Acceptance of mistakes and fear of failure were significantly correlated with each other in both samples. Japanese undergraduates showed significantly lower scores of acceptance of mistakes and higher fear of failure scores than American undergraduates. However, incremental theory was not significantly related with acceptance of mistakes in both samples, and positively related with fear of failure for American sample. Optimal ways of the intervention for the mitigation of fear of failure in each of two cultures are discussed.

P 9
01 September 2007 11:00 - 12:20
Room: 1.71 Pócza
Paper Session

Social aspects of learning

Chair: **Richard Walker,** University of Sydney, *Australia*

Exploring the links between analogy use in conversation and children's conceptions of science
Jill Hohenstein, King's College London, *United Kingdom*
Maureen Callanan, University of California, Santa Cruz, *USA*

Analogies (comparing familiar material to novel material for purposes of demonstrating ideas) have been shown to be useful tools for understanding new concepts. In particular, analogies that are relational as opposed to superficial appear to be most beneficial to learning. However, research demonstrates that it is difficult for people to adopt analogies to solve problems without some instruction. Recently research has begun to address how people use different kinds of analogies in various informal settings. This paper aims to examine children's conceptions of science and family uses of analogy in order to complement studies of the relations between how families converse in museum settings and children's conceptions of science. In a marine science centre, 25 families (25 children) participated in videotaped interactions at different exhibits followed by child interviews. Using both qualitative and quantitative analyses, results suggest that families who make use of analogy in discussing concepts encountered in the museum include children who think complexly about science. Further, these same families engaged in many open-ended questions, compared with closed-ended questions. Thus, we conclude that parents incorporate a variety of different 'high-level' conversation techniques, which supports children's thinking of science in complex rather than simple terms.

Predicting elementary students' adjustment at school: The case of social achievement goals
Athanasios Mouratidis, University of Leuven, *Belgium*
Christos Giouzelis, University of Crete, *Greece*
Stefanos Kotrotsios, University of Crete, *Greece*

This study aimed to investigate the relation between social achievement goals (Ryan & Shim, 2006) and social related behavior as predictors of peer acceptance, and perceptions of belongingness and loneliness at school in a sample of elementary school students. Two hundred forty-two (118 boys and 124 girls), fifth and sixth-grade students participated in this study. Students were asked to indicate their achievement goal orientation into the social domain, their

perceptions of belongingness to their class group, and their perceptions of loneliness at school. Students' peer acceptance was assessed through sociometric techniques whereas students' prosocial and antisocial behavior was rated by their teachers. Structural equation modeling analysis favored a model in which social development goal was negatively related to feelings of loneliness through the mediating effect of perceived belongingness. Social demonstration-avoid goal was positively related to perceptions of loneliness. Social demonstration-approach goal was positively related to loneliness through its negative relation to peer acceptance, which along with perceptions of belongingness, was negatively related to loneliness. Finally, prosocial behavior was a positive predictor of peer acceptance whereas antisocial behavior, though negatively related to prosocial behavior, remained unrelated to peer acceptance. Results are discussed within the recent conceptualization of social achievement goals and the broader educational perspective that underscores the important role of social goals and prosocial behavior on schooling (e.g. Wentzel 1999). References Ryan, A. M., & Shim, S. S. (2006). Social achievement goals: The nature and consequences of different orientations toward social competence. Personality and Social Psychology Bulletin, 32, 1246-1263. Wentzel, K., R. (1999). Social-motivational processes and interpersonal relationships: Implications for understanding motivation at school. Journal of Educational Psychology, 91, 76-97.

The Turkish teacher: profiles of teacher-student interpersonal behaviour in Turkish' secondary science classes
Sibel Telli, Middle East Technical University, *Turkey*
Jale Cakiroglu, Middle East Technical University, *Turkey*
Perry den Brok, Utrecht University, *Netherlands*

The present study investigated to what extent an earlier found typology of teacher interpersonal behaviour also applied to a sample of Turkish secondary school teachers. Teacher interpersonal behaviour was measured by asking students for their perceptions of their teachers' interpersonal behaviour using the Turkish version of the Questionnaire on Teacher Interaction (QTI). This study reports on the first attempt to create a teacher typology in Turkey with this instrument. A total of 7484 students (grades 9 to 11) from 278 science classes (55 public schools) in thirteen Turkish cities participated. Cluster analyses, using different clustering methods and procedures, were conducted to determine Turkish teaching styles and findings were compared to earlier Dutch, US and Australian findings. Student perception data were aggregated to the class level. Results of the cluster analyses were verified with analyses of variance (ANOVA) and by plotting QTI profiles graphically. Results indicated that the best and most distinctive typology found in the data consisted of six types for Turkish sample. However, having some uniqueness, many teachers in this typology could be classified in terms of the original Dutch/US typology. Because the Turkish typology explained similar or lower amounts of variance in scales (and dimensions) and because profiles to a large degree corresponded with the original US/Dutch typology, it seems that the original typology is relatively stable for secondary education and applies to different countries and cultures, including Turkey.

Predicting children's sense of relatedness in primary school
Yuka Nakamura, Zurich University of Teacher Education, *Switzerland*
Alex Buff, Zurich University of Teacher Education, *Switzerland*
Judith Hollenweger, Zurich University of Teacher Education, *Switzerland*

According to the Self-determination theory (Deci & Ryan, 1993) relatedness is one of three fundamental needs. Evidence from earlier studies shows children's sense of relatedness toward

their classmates and teachers to be an important factor contributing to their engagement, interest and well-being. However, only few studies have looked into the factors which might influence the sense of relatedness. This study of 499 primary school children and 31 teachers explored the relationship between child and teacher characteristics and relatedness. At the beginning of the first primary school year the IQ and social competence of the children were assessed. In the middle of the second school year sense of relatedness in the children and teacher efficacy regarding classroom-management were measured. The data were analyzed using a multilevel approach. Although the scores for relatedness were generally high, the results showed that sense of relatedness varied significantly across the classes. Sense of relatedness was predicted by sex, IQ and social competence of the child as well by teacher efficacy. Girls reported significantly higher levels of relatedness. Social competence as well as teacher efficacy predicted sense of relatedness positively. Contrary to expectations sense of relatedness was negatively related with IQ. Additional explorative analyses showed that there were significant interactions between IQ and sex and between IQ and social competence. For boys and for children with lower social competence scores the effects of IQ were stronger than for girls and for socially competent children. Implications for future research regarding these relationships are discussed.

P 10
01 September 2007 11:00 - 12:20
Room: 3.67 Békésy
Paper Session

Collaborative learning

Chair: **Kristiina Kumpulainen,** University of Helsinki, *Finland*

Instructional support for the generation of new shared knowledge in collaborative problem solving
Anne Meier, University of Freiburg, *Germany*
Hans Spada, University of Freiburg, *Germany*

Groups of learners and problem solvers can profit greatly from pooling and integrating their members' complementary knowledge. In particular, new knowledge can be built at the group level by drawing inferences from the information contributed by individuals. Unfortunately, groups tend to focus on information that is known to all members from the start (shared knowledge) and neglect members' unique (unshared) knowledge. Experimental research on the effects of information sharedness on group discussion, however, has so far focused on the mere pooling of information and neglected higher levels of information processing, i.e. the collaborative construction of new knowledge. The present study therefore investigated whether biases towards shared information can also be found at the level of inferences, and explored two kinds of instructional support for overcoming such biases. Student dyads collaborated via a desktop video-conferencing system on a murder mystery task requiring them to draw inferences from both shared and unshared pieces of information. Three experimental conditions were realized: A control condition was compared to two instructed conditions which were informed about typical task difficulties, and either planned their own collaboration (planning condition), or received external guidance from a collaboration script (script condition). Data collection has not yet been completed, but dialog analyses for the currently available 12 dyads already revealed the expected biases: dyads pooled more shared than unshared information, and also drew more inferences from shared

than from unshared information. Instructional support helped dyads to overcome these biases: Dyads in the two instructed conditions pooled and integrated more unshared information than controls. They also solved the case correctly more often compared to unsupported dyads. Preliminary findings suggest that planning one's own collaboration may lead to even better problem-solving than following a collaboration script.

The effects of collaborative group work training on transition from primary to secondary school in rural and urban schools
Allen Thurston, University of Dundee, *United Kingdom*
Keith Topping, University of Dundee, *United Kingdom*
Donald Christie, University of Strathclyde, *United Kingdom*
Andy Tolmie, University of Strathclyde, *United Kingdom*
Pauline Murray, University of Dundee, *United Kingdom*
Mary Swan, University of Dundee, *United Kingdom*

A previous Economic and Social Research Council (ESRC) funded Teaching and Learning Research Programme project on collaborative learning in primary schools in science (ScotSPRING) preceded the current project. A team from Strathclyde and Dundee Universities worked in 24 schools in 8 local authorities across Scotland. Gains in science understanding and in social and emotional aspects of school life were found. Interesting differences between rural and urban schools emerged. Positive changes over time in quality of interaction in the classroom (evidence of higher quality implementation) were associated with better outcomes. Urban single-age classes tended to start low and make the biggest gains. These findings were previously reported at the 11th Biennial Conference of EARLI in Nicosia. This paper reports findings of a longitudinal research project that followed children involved in the original research as they undertook transition from primary to secondary school. The research was supported by a grant from ESRC and Scottish Executive Education Department. This project looked at the longevity of gains in science attainment and changes in social connections between the pupils. Finding indicated that social gains survived transition from primary to secondary school. Children in the original research project were more likely to have stronger social connections than those who were not. Gains in science attainment originally reported by the previous research were more likely to sustain in children who had undergone transition in a rural, rather than an urban setting.

Dyadic cooperative work on texts at primary school: The role of information distribution
Celine Buchs, University of Geneva, *Switzerland*
Marion Dutrevis, University of Geneva, *Switzerland*
Kico Rama, University of Geneva, *Switzerland*

Previous studies have indicated that resource interdependence (information distribution) elicits two different dynamics in regard to student interactions and learning at university. Working on complementary information produces more positive interactions; however, a good quality of information transmission is needed in order to guarantee learning. Working on identical information produces confrontation of points of view as well as a focus on social comparison of competence, which is threatening for one's own competence; this threat has a negative impact on learning. The present study aims at investigating whether these two dynamics can be relevant at primary school. 30 fifth grade pupils were requested to work in cooperative dyads on two texts, either on complementary or on identical information. One pupil was asked to summarize the text while his/her listener helped by asking questions. Roles were reversed for the second text. Results indicate that pupils performed poorer when they worked on complementary than on identical

information because listeners who worked on complementary information performed poorer. Analyses of pupil interactions are in process. Results regarding interactions on one text indicate that summarizers' involvement in information transmission is important when pupils work on complementary information. When working on complementary information, the positive relation between summarizers' informational contribution and their listeners' learning illustrates the informational dependence. In contrast, this relation is negative when working on identical information, what suggests that even young pupils are sensitive to social comparison of competence. This study underlines that working on complementary information favors pupils' involvement in information transmission, but teachers may be aware that reading and summarizing in a short time may be difficult for young pupils. Teachers should also be aware of the competence threat that can interfere with learning when their students have to work on identical information.

Factors affecting the use of the interactive whiteboard in primary classrooms to support children's collaborative learning and knowledge-building.

Ruth Kershner, University of Cambridge Faculty of Education, *United Kingdom*
Paul Warwick, University of Cambridge Faculty of Education, *United Kingdom*

In recent years UK schools (primary and secondary) have seen the extensive introduction of interactive whiteboards (IWBs) into classrooms, commonly used to support teacher-led whole class teaching, presentation and demonstration. This research focuses on the extension of IWB use in primary (5-11years) classrooms to support children's semi-autonomous collaborative learning activities. This study takes the form of a 'guided research group' involving eight teachers in five different primary schools. Drawing on the principles of social constructivism, each teacher gathered a range of qualitative data about how the IWB use appeared to support children's collaborative learning, specifically focusing on knowledge-building in different curriculum areas. Themes drawn from the teachers' individual and collective findings indicated the importance of factors relating to the collaborative learning process, the children's technical skills and confidence, the mediating role of the teacher, the importance of the physical accessibility of the IWB, and the IWB affordances relating to provisionality, justification and temporal development in knowledge-building. General conclusions are drawn about the motivational aspects of the learning process and about the IWB as an element in the evolving tool systems evident in classroom activity. Of particular educational significance is the conclusion that teachers' professional development in the use of information and communications technology should necessarily be integrated with discussion of learning and teaching rather than focusing on technical skills alone.

P 11
01 September 2007 11:00 - 12:20
Room: 2.54 Novobátzky
Paper Session

Social interaction in learning and instruction

Chair: **Marcel Crahay,** Universite de Geneve, *Switzerland*

Course taking and student achievements meta analysis and a critical review of the literature
Boaz Shulruf, University of Auckland, *New Zealand*
Dominic Keuskamp, The Flinders University of South Australia, *Australia*

Students choose subjects in secondary schools that can be major determinants for their future educational career. This study used aspects of realist synthesis integrated with systematic review methodology to review the effect of secondary school course-taking on educational outcomes in secondary and tertiary institutions. We found a wide body of research on course-taking, yet relatively few examples of peer-reviewed quantitative research on the review topic. The selected studies, however, concurred with previous research by concluding that course-taking predicts a number of educational outcomes. The largest effect sizes were found for further course-taking outcomes at secondary level (.50) or tertiary level (mean 0.29 to 0.67 depending on population and specificity). A small effect size (.24) was found for the effect of course-taking on achievement (as measured by test scores or GPA). The nature of those effects however, was sometimes difficult to disentangle from the diversity of factors, such as ethnicity, socioeconomic status (SES) and prior achievement that are co-correlated with course-taking and its outcomes. In addition, very few of the studies selected for the review covered course-taking from the last decade. Future course-taking research should focus on contemporary data, to keep up-to-date with curricula changes, and when measuring effects of course-taking on student outcomes, analyses should control for previous course-taking and achievements effects.

Teacher coaching in English schools: A space for learning or tool for control?
David Leat, Newcastle University, *United Kingdom*
Elaine Hall, Newcastle University, *United Kingdom*
Rachel Lofthouse, Newcastle University, *United Kingdom*

Coaching is an increasingly popular form of professional development, due to a range of factors including the evidence indicating its effect on student attainment and its visibility in our wider culture ('life', sport and leadership). In England coaching is being tried in many schools but the impact is very varied. The paper presents data from two projects. The first draws on semi-structured interviews with 25 teachers reflecting on the experience of coaching and the second uses the analysis of coaching sessions. The data suggests that teachers are very positive about their face-to-face experience, both as coaches and 'coachees', detailing many positive aspects including the opportunity to revisit episodes in lessons and analyse them with the aid of video and the focus on formative improvement of teaching approaches rather than summative judgement of teaching performance. However, in most schools there are many practical difficulties such as lack of time and money, problems with technology for filming and more systemic problems of management, including indifference, misunderstanding or interference. This is interpreted as a clash of cultures between coaching, with roots in counselling, and management ideologies prevalent in English schools. There is considerable variation in the content of coaching conversations: for example the

foci are different, the reference to underpinning rationales or theoretical frames is varied, the balance of talk and analysis between the coach and the 'coachee' is very uneven. We discuss the need for school leaders to provide 'learning space' (Clement & Vandenberghe, 2000) for teachers to develop both autonomy and collaborative professional development. This is increasingly important as governments seek to move away from centralised control of education in order to develop more creative and responsive educational systems.

Negotiating and re-negotiating conversational ground rules. Applying the Thinking together - approach in a Finnish context
Jaakko Hilppo, University of Helsinki, *Finland*
Lasse Lipponen, University of Helsinki, *Finland*

Building on a socio-cultural framework on learning (Wertsch 1991, Lave & Wenger 1991) this study applies the Thinking together -approach (Mercer et al. 1999) in a Finnish elementary school context. At the heart of the programme lies a set conversational ground rules designed to promote exploratory engagement in collaborative learning tasks. Yet for any educational programme to be successful it has to take seriously the concerns, agendas and ideas of the participants involved. In other words it has to adapt to the local context of the intervention. The aim of the study is to focus on the intercontextuality of the conversational ground rules as they are constructed and adopted as the common knowledge of the classroom. The intercontextual analysis will look closely at the sociocultural trajectories (Kumpulainen et al. 2003) of each of the ground rules. This is seen to provide insight into the "long conversation" (Mercer 2000) of that particular community and also into the construction of a tool designed to promote exploratory collaboration.

Formulating text: The practice of commenting in academic writing
Gustav Lymer, Department of Applied IT, Göteborg University, *Sweden*
Johan Lundin, Department of Applied IT, Göteborg University, *Sweden*

The practice of commenting and criticizing text is pervasive in higher education. The goal of this study is to provide an ethnomethodologically informed understanding of this instructive practice, through analyses of teachers' ways of formulating comments to student texts, and students' ways of using these comments. The study builds on video-data from a course in "applied research method", given as part of a study program where students learn to apply social scientific methods and perspectives to design. The second half of the course is mainly built around a project where the students are to perform ethnographic studies of workplaces. Based on their findings, they write a report. We videotaped and analysed the instruction sessions involving teachers and students, and some of the students' own meetings, where they discuss and apply the teachers' instructions and comments. Based on these analyses, we discuss three interrelated points: first, the teacher's practices of formulating instructions and exercising his competencies are seen as inextricably bound to the students' texts and made possible by those texts; second, the students' ways of using comments is conceptualized as a thoroughly material and analytic practice, in which annotated copies of the report are used to recreate "what the teacher meant"; and third, we argue that common apprehensions about direct text instruction – as either providing students with easy fixes, or being incomprehensible to students in presupposing knowledge that they do not have – might be unwarranted, given the work students do in order to follow even "simple" instructions.

P 12
01 September 2007 11:00 - 12:20
Room: 4.95
Paper Session

Student learning in higher education

Chair: **Carmen Vizcarro,** Universidad de Castilla la Mancha, *Spain*

Parallel transcripts to capture parallel perspectives on a shared experience: what they tell us about student learning
Lynn McAlpine, Mcgill University, *Canada*
Cynthia Weston, McGill University, *Canada*
Julie Timmermans, McGill University, *Canada*

In this study, we undertook to examine the assumed but undocumented relation between teacher reflection and student learning. The challenge was to find a way to capture student thinking in order to see if any such relationship existed. Since many factors other than reflection-on-teaching may affect student outcomes in a course, we focussed on student thinking in class as we had used such an approach as one means of capturing reflection. The line of thinking was the following. We knew that when professors reflected in class, they were attending to classroom actions and how students responded. If we could capture how classroom actions were interpreted by students, actions could become the connecting point for examining any possible relation between reflection and student learning. Having a conception of what we wanted to achieve, the challenges of implementation were successively - how to collect, how to prepare, and how to display the data in a way that would facilitate analysis. While many in the social sciences are interested in capturing co-occurring views on a shared experience (e.g., doctor-patient consultations), we found little and somewhat variable guidance from the literature. So we developed and piloted the method as we proceeded. The result of our efforts are a) new insights into student thinking in class which have implications for teaching and b) design principles we believe useful to other researchers wanting to examine co-occurring perspectives on a shared experience. These will be elaborated in the session.

Self-beliefs and prior knowledge as predictors of student achievement in mathematics: A structural model
Telle Hailikari, University of Helsinki, *Finland*
Anne Nevgi, University of Helsinki, *Finland*

The aim of the study was to explore the interplay between prior knowledge, self-beliefs and previous study success in predicting student achievement of 140 students in a university mathematics course. The significance of these two construct, prior knowledge and self-beliefs, as necessary prerequisites for successful learning have been well established but research results regarding the predictive value of each construct have been somewhat contradictory. Structural equation modelling was used to explore the interplay of these variables in predicting student achievement. Results revealed that prior knowledge was the strongest predictor of student achievement over and above other variables included in the model and it explained 55 % of the variance together with previous study success. Self-beliefs as a leaner were strongly correlated with previous study success and had a strong direct influence on prior knowledge test performance. However, self-beliefs predicted student achievement only indirectly via prior knowledge. The results imply that both prior knowledge and self-beliefs should be taken into

account when considering instructional support issues because they can give valuable insights about the future performance of the students.

Evaluation of the 'received' ethics curriculum in medical school: students' experience perspective
Edna Benshalom, Kaye Cellege of Education, *Israel*

The study addressed ethical curricular aspects of medical education, as perceived and evaluated by students. The study was based on two theoretical premises: the 'total curriculum' as a broad flexible interactive concept (Kelly, 1999), and the 'received curriculum', which regards students' experience of the curriculum as a valid and valuable source of its evaluation (Jackson, 1992). The qualitative-interpretive study was conducted through interviews with six-year medical students (at their last year in medical school). The results revealed that (I) Students perceived their 'received ethics curriculum' as 'total curriculum' - holistically "ethics laden" curriculum, manifested by various formats of ethics teaching (courses, panels, symposia, week-conferences, special-guest lectures). (II) Students' experience, and relevancy to their reality were the major measuring-stick for students' perception and evaluation; (III) Students exposed 'hidden curriculum' constructs: They seemed to be aware of the modelling aspects of ethical teaching/learning within clinical training; They described the factors delineating the latent processes of experience gathering and ethical code construction through conflicts, contradictions and paradoxes; They expressed awareness of the factors that encourage ethical learning, as opposed to factors that hinder it; They analyzed the contradictions between declared and observed norms and between formal and informal demands. The study sustains the conclusion that a methodology of retrospective interviewing of adult students can provide curriculum planners with significant insights about holistic considerations and the relative importance of curricular elements, and about the difficulties that a training program might present to students. The paradigmatic strength of students' evaluation-interpretation of the curriculum through their experience lies within its authenticity, awareness and reflection. The study's implications might enhance processes of curriculum shaping according to students' evaluation, as well as processes of students' empowerment and student voicing.

Assessment's role and effectiveness in developing potentials for student learning: Multiple perspectives on undergraduate distance and online course assessment practices at an Australian university
Patrick Danaher, University of Southern Queensland, *Australia*
R. E. (Bobby) Harreveld, Central Queensland University, *Australia*
Teresa Moore, Central Queensland University, *Australia*

The contribution of assessment to developing potentials for student learning is complex and diverse. In order to explore that contribution, this paper analyses findings from an intensive study of the assessment practices and tasks in a selection of undergraduate distance and online courses at Central Queensland University, Australia. The study was conducted in the second half of 2004 and entailed a detailed mapping of the course profiles, followed by semi-structured interviews with 20 academics representing all five faculties and several disciplines in the university. Interview transcripts were analysed using Gee's (1996a, 1996b) 'Big D/little d' D/discourse theory, with a view to identifying and engaging with the powerful yet often unconscious assumptions and worldviews that underpin academics' attitudes to assessment. These assumptions and worldviews were made explicit through the interplay between the 'Big D' organising structures and the 'little d' 'language bits' manifested in the course profiles and the interview transcripts. The findings demonstrate that the contribution of assessment to developing student learning is embedded in, and

located at, the intersection of the academics' multiple perspectives on the purposes and impact of assessment in their respective courses and disciplines. Integrating these multiple perspectives in order to maximise that contribution is complicated by the need to recognise the multilayered contexts in which learning and assessment are enacted, and by the heterogeneity attending the academics' ideological constructions of assessment in relation to such contemporary 'hot topics' as generic skills and graduate attributes, the effectiveness of online content and course management systems and the current commodification of knowledge, by which education is a 'good' and assessment confirms the learner's purchase of that good. D/discourse theory is an appropriate means of highlighting and interrogating those contexts and that heterogeneity, and thereby of evaluating the contribution of assessment to developing potentials for student learning.

P 13
01 September 2007 11:00 - 12:20
Room: 0.100B
Paper Session

Student learning in higher education

Chair: **Richard Joiner,** University of Bath, *United Kingdom*

Exploring the impact of environment, behaviour and personal characteristics on the development of oral presentations
Luc de Grez, Vlekho Business School, University of Leuven, *Belgium*
Martin Valcke, Ghent University, *Belgium*
Irene Roozen, Vlekho Business School, University of Leuven, *Belgium*

Although teaching of presentation skills is a very important topic in education, it has hardly been researched. The aim of this paper is to investigate two parts: (a) Learning part: the relationship between the student characteristics, their learning process and their performance; (b) Instructional part: the importance of 'self reflection' and 'general versus specific goal-setting'. The research design is based on our theoretical framework where we have analysed reciprocal interactions of instruction, performance and student characteristics. The experimental subjects were first year students (n=101). First, student characteristics were collected. Later, they have received information about effective non-verbal behaviour in general and in the context of an oral presentation. They were randomly assigned to one of four experimental conditions in a 2x2 factorial design (general/specific goal setting and no- or invoking self reflection). In each condition the students participated in three sessions and delivered during each session a 3-minute presentation. The presentations were videotaped and analysed by experienced researchers. Both were unaware of the research questions. The results show that it is possible to teach students to give better oral-presentations. The study resulted in a relevant research instrument to assess oral presentation skills. The research results also give a first view of the complex interrelated nature of variables that plays a role in the acquisition of oral presentation skills. The motivational constructs 'self-efficacy', 'achievement goal' and 'attributions' play a significant role and need further exploration in future research. As to the experimental intervention, goal setting has been detected to be a significant design variable. Fostering self reflection did not result thus far in significant differences.

Relationships between students' strategies to influence their study environment and their study achievements and approaches to studying
Tomas Jungert, Department of Behavioural Sciences, *Sweden*
Michael Rosander, Department of Behavioural Sciences, *Sweden*

The aim of this study is to explore the relationships between the strategies that engineering students in a Swedish context use in order to influence their study environment and their academic achievements and their strategic approaches to studying. The Swedish Higher Educational context has a distinguishing characteristic in the Swedish students' statutory rights to influence their study environment by various means. Participants were 90 students enrolled in the third and fifth semester of a Masters programme in Applied Physics and Electrical Engineering. Data was collected by means of two questionnaires; the first questionnaire, which was distributed to the students in class during their first week of the semester, measured the students' degrees of strategic approach to studying, while the second questionnaire, which was distributed in class six weeks into the semester, asked about what strategies students usually use to influence their study environment and what strategies they had used during the recent week. A factor analysis with Varimax rotation of the nine items of strategy to influence resulted in three factors explaining 61 % of the variance. The factors were extracted using a principal component analysis. The three factors indicate that there are three categories of strategies to influence the study environment; a horizontal strategy, whereby students seek support from peers to influence, a vertical strategy whereby students try to influence their teachers, and a passive strategy, whereby only mostly statutory means of influencing were used. Relationships between strategies to influence and academic achievement will be analysed at the end of the semester. Findings of the second aim show that strategic approach to studying and its sub-scale levels time management and monitoring effectiveness were associated with a vertical strategy to influence the study environment, while the sub-scale level achieving was associated with a passive strategy to influence their studies.

Methodology in information systems development: An online forum within a hybrid graduate course
Dov Dori, Technion, *Israel*

Meaningful learning takes place when students are actively engaged in exploration of and argumentation about the subject matter under study. To attain such meaningful learning, the graduate/undergraduate elective course "Methodologies in Information Systems Development" was conducted as a hybrid course. This course was aimed primarily at Information Systems Engineering students and its goal was to study and practice methods, approaches and techniques for developing complex systems in the areas related to systems engineering and information technology. The course combined bi-weekly face-to-face class sessions interleaved with tutorials and five-day periods of online forum discussions and required the students to work in teams. Each team had to read an assigned paper or chapter, open a discussion in the online forum, respond back to students' answers, and present summary and conclusions in class. The assumption was that this graduate course can potentially improve learning processes compared with traditional learning and Web-based learning. The educational value students gained from the active learning that took place in this course will be demonstrated by insightful examples of the vivid discussions that developed in the online forum and the feedback students provided on this hybrid course format. Students welcomed this fresh mode of teaching, feeling they covered a lot of ground while still experiencing meaningful and overall enjoyable learning via teamwork. Main points for improvement, as reported by the students, include higher staff involvement in the online forum, clearer definitions of the time constraints, a short introduction to each topic prior to the forum

commencement, and more linkage between the topics of the forum, class discussions, and those of the tutorials. Recommendations for adopting this course structure for teaching technology-related issues in higher education will be presented in the talk.

Conceptualising participation: Personal development planning for undergraduate students in UK higher education
Catherine Howell, University of Cambridge, *United Kingdom*

This paper applies a phenomenographic perspective to the interpretation and analysis of a student-centred, developmental research project in higher education. The Personal Development Planning (or PDP) Project at the University of Cambridge aims to institutionalize and embed reflective practice as a non-assessed, non-compulsory activity for all undergraduate students. Students' responses to open-ended questions about their attitudes to learning, and the methods they use to develop skills, were used to map three dimensions of reflective practice: concepts, contexts, and tools. These dimensions are not static, but are shown to interact in complex ways. Parallels with the alternative approach of activity theory are discussed. The spectrum of engagement with PDP is described in terms of individual choices and motivations for negotiating the overlapping dimensions of reflective practice at a collegiate university. In terms of evaluating the respective contributions of these two critical perspectives, the value of activity theory is shown to lie in its ability to analyze the cross-sectoral implementation of PDP as a change process in higher education. By contrast, the value of phenomenography lies in its usefulness as a tool for interpreting students' individual experiences of participation in higher education.

P 14
01 September 2007 11:00 - 12:20
Room: 0.99
Paper Session

Writing

Chair: **David Galbraith,** Staffordshire University, *United Kingdom*

Stimulating the generation of counterarguments during writing
Hermann Astleitner, University of Salzburg, *Austria*
Michael E. Nussbaum, University of Nevada, Las Vegas, *USA*
Manfred Hofer, University of Mannheim, *Germany*

Within this study, it was investigated how university students can be encouraged to consider more counterarguments during writing argumentative texts. One hundred eighty undergraduates wrote essays on TV violence. In Experiment 1, students, which were given specific goals, generated more counterarguments and rebuttals than controls and than a group, who was stimulated to give reasons for arguments. In Experiment 2, one group of participants was provided with a text outlining arguments and counterarguments. Another group was asked to write a persuasive letter. Persuasion instructions had no or small negative effects. Text positively affected supporting reasons for primary claims and the overall quality of arguments. There were no effects of prior attitudes or gender. The danger of using persuasion goals and the advantages of specific goal instructions are discussed.

Keyboard typing or handwriting: Which leads to better performance in university students and secondary school students?
Joachim Grabowski, Heidelberg University of Education, *Germany*

We report on a research project based on the assumption that, in low-ability secondary school students, keyboard typing would facilitate writing tasks as compared to handwriting. For these students (as opposed to university students who were also studies in comparison), keyboard use is more motivating, and handwriting is not yet fully automated. It turned out, however, that there is a substantial lack of knowledge of basic keyboard functions such as using the space bar, creating upper-case letters, performing corrections, or navigating through the text. As a result, we conducted a study in which we applied a five hour training of basic keyboard functions. Pre- and post-tests were taken with a copy task, thus concentrating on low-level processes (transcription and execution). All writing activities were recorded with ScriptLog. Results show substantial positive effects on time on task, transition times between letters, general keyboard activity and navigation. However, correcting behavior and text quality did not change after such a brief training.

Using L1-acquired knowledge about writing in FL writing: An exploratory study
Anna Inesta, Ramon Llull University, *Spain*
Montserrat Castello, Ramon Llull University, *Spain*

Two main questions have guided L2 writing research: one refers to the influence of L2 proficiency and knowledge about writing or writing skill, and the other refers to the role of L1 use in L2 writing. Our exploratory study aimed to contribute to clarify such questions by exploring the influence of L1-acquired strategic knowledge about writing in the foreign language writing process. Participants were an undergraduate and a postgraduate student at the Universität Ramon Llull. The latter had attended an academic writing seminar thus having presumably acquired complex knowledge about writing in her L1. Participants' L2 proficiency level was between intermediate and advanced. Data regarding their conceptions about writing and about themselves as writers were collected by means of an open-ended survey adapted from Lonka et al. (1996), a semi-structured interview, and a stimulated recall interview. The use of L1-acquired strategic knowledge and the role of writers' L1 during the FL writing process were analyzed by means of the think-aloud protocols, connected with the evolving text, and the stimulated recall interview. All these data were audio and video recorded. Using the same argumentative task as Raimes (1985), and Roca de Larios et al. (2001), a modification was introduced halfway through the writing process in order to promote on-line use of regulation strategies. Transcriptions of the data were analyzed qualitatively (using content analysis) and quantitatively (in terms of frequency and temporal distribution of writing strategies). The results obtained show, firstly, that writer 2 used L1-acquired writing strategies during FL composition process. Secondly, results also show that L1 use was mostly associated with process regulation. Finally, strategic knowledge about writing allowed writer 2 to successfully regulate her negative feelings towards the task.

Early correlates of word reading and passage comprehension in Greek
Panayiota Kendeou, Cyprus Pedagogical Institute, *Cyprus*
Timothy C. Papadopoulos, University of Cyprus, *Cyprus*
Maria Constantinidou, Cyprus Ministry of Education and Culture, *Cyprus*
Stefanos Demetriou, University of Cyprus, *Cyprus*

The aim of the present study was to identify early correlates of word reading and passage comprehension in a Greek-speaking population. 320 children participated in this study. Measures representing rapid naming (RAN), phonological awareness, nonverbal and verbal ability, speech rate, working memory, and word reading were administered in kindergarten. Following a year later, the same measures in addition to a passage comprehension measure were administered in Grade 1. The analysis showed that in kindergarten, although all measures were highly interrelated, only rapid naming, phonological awareness, and working memory directly predicted word reading. In Grade 1, all measures also were interrelated. Word reading was directly predicted by phonological awareness, working memory, and nonverbal ability. Passage comprehension was directly predicted by phonological awareness, nonverbal ability, and word reading. These findings are important for two reasons: (a) they indicate that phonological (as tapped by phoneme elision and sound isolation) more than the rapid automatized naming measures have higher predictive power on passage comprehension, a striking finding countered to what predicts word reading in Greek, and (b) they strongly support the notion of word recognition modularity in a salient orthography as far as the prediction of reading comprehension is concerned.

P 15
01 September 2007 11:00 - 12:20
Room: Harmónia
Paper Session

Computer-supported learning environments

Chair: **Constantinos P. Constantinou,** University of Cyprus, *Cyprus*

Tracing evolving technology-enhanced learning community and its territorial reference points in higher education milieu
Johanna Poysa, University of Jyväskylä, *Finland*
Joost Lowyck, University of Leuven, *Belgium*
Päivi Häkkinen, University of Jyväskylä, *Finland*

The aim of this study was to search for the conceptual origin of learning community and its reference points in the context of technology-rich higher education milieu: to explore what might create appropriate conditions for successful higher education practices to emerge; based on the values of community and collective learning. To encapsulate the concept of community, a spatial metaphor associated with an emotional attachment to Place (Tuan, 1977; Casey, 1996) were seen to offer fundamental grounds and diverse perspectives for this work. The study examined first, what constituted the 'territorial' reference points of the participants' unity over a technology-enhanced university course: how on- and offline learning environments were experienced to come together over the course (hybrid Place experiences and its relational patterns; Mitchell, 1997). Second, the study aimed to visualise the process over which these relational patterns were produced: how participants constructed their shared experience of 'Learning Place' over the course (Ganbernini & Mantovani, 2003).To study individual participants' perspectives in collective activities, an ethnographically oriented approach with its multiple methods was applied. Data set involved personal process notebook data, accompanied with observations in the on- and offline learning environments. From the data, first, thematic categories for the experiences of hybridity were identified, followed by a descriptive polyvocal account of social construction of Place. The

results showed how participants' experiences originated from a confluence of divergent milieus, as offline, distributed, and online experiences of hybrid Place. Over the process, the ways in which they made the use of technologies an 'ordinary' practice was silent, yet effective revealing the many creative and economical ways in which the participants made use of the social and material elements- including technological tools - available for them over the course.

Facilitating the development of the modeling ability of fifth graders: a comparison of the effectiveness of two instructional approaches
Marios Papaevripidou, University of Cyprus, *Cyprus*
Constantinos P. Constantinou, University of Cyprus, *Cyprus*
Zacharias Zacharia, University of Cyprus, *Cyprus*

This study aimed to investigate the effect of an explicit and an implicit modeling-based instructional approach on the development of the modelling ability of fifth graders. Modeling has been identified in the literature as a potential scaffold for more effective science teaching and learning. Three constituent components, identified through previous research, are thought to shape the modeling ability: modeling skills, metacognitive knowledge about the modeling process and meta-modeling knowledge. A pre-post comparison study design was used, which involved two groups. The first group (n=16) received an explicit modeling-based instruction that combined the construction of paper-and-pencil representations and the iterative development of computer-based models (CBM group). The second group (n=17) received an implicit modeling-based instruction that combined the construction of paper-and-pencil representations and the iterative design of a role-playing game (RPGM group). The role playing games took the form of run and chase games where the students were assigned predator and prey roles in a pre-determined space which they formulated with objects representing plants. All the models constructed throughout the two instructional approaches aimed at representing and interpreting a specific ecosystem as observed through a video documentary. Paper-and-pencil tests were administered both before and after the interventions in order to assess the development of conceptual understanding about ecosystems by the participants. The data were treated both qualitatively and quantitatively. The findings of the study indicate that the explicit modeling-based instruction enhanced the development of the modelling ability more than the implicit modeling-based instruction. Our findings have implications for curriculum design and implementation in the domain of science.

Over six years (2000 – 2006) of collaborative knowledge building, using Knowledge Forum®
Mauri Ahlberg, University of Helsinki, *Finland*
Jarkko Myllari, University of Helsinki, *Finland*

The aim is to describe, analyse and reflect on one of the longest known design experiments of collaborative knowledge building that is ever done. One of the aims is also to deepen and enrich theory of collaborative knowledge building in an integrating way. Most design experiments of collaborative knowledge building last only a couple of weeks or months, very rarely over a year. Multi method research strategy is used. The collaborative knowledge building project is approached as a case of school improvement projects. This overarching main case of collaborative knowledge building includes multiple cases of teacher development and learning. Together there are over 1300 notes in the Knowledge Forum® platform. These are the main data of this study. These notes are part of the discussion and knowledge building. They are analysed by many methods, both quantitatively and qualitatively. It was found that these six years can be divided into four phases. These are partly overlapping phases of active knowledge building. At the beginning of each phase some members become active and some others may drop away. Only one of the

members of this knowledge building community stays over all these phases. This research is theoretically and educationally very important. It demonstrates that under favourable conditions very long term collaborative knowledge building can be created to promote school development and teachers' professional development. New creative ways to use earlier research methods to analyse collaborative knowledge building, were created.

Feeling affectively connected in computer mediated communication: a proposal of dimensions to capture the relevance of social presence for effective learning in online discussions

Rosa Colomina, University of Barcelona, *Spain*
Maria Jose Rochera, University of Barcelona, *Spain*
Mila Naranjo, University of Barcelona, *Spain*
Ana Remesal, University of Barcelona, *Spain*
Rosa Mayordomo, University of Barcelona, *Spain*

The purpose of this paper is to present a study about social presence. The social presence has been identified in different previous studies as an essential element for the understanding of knowledge construction processes in virtual environments. Yet, these studies also have shown the difficulty of tackling the study of social presence, both from a theoretical and from a methodological point of view. Our study grounds on a socioconstructivist perspective, which emphasises the importance of the educational intervention in teaching and learning processes. We intend to analyse some aspects related with the way in which social presence allows the participants to increase the meaningfulness of the learning process. We analyse the postings to a virtual forum by one teacher and 17 freshmen, using the platform Moodle, in a blended course of Educational Psychology in a School of Teacher Education. The work consists of the elaboration and interpretation of different dimensions and units of analysis based on a content analysis in order to identify aspects of social presence of the participants and its evolution along the on-line discussion. The results allow us to identify different types and levels of participation in online discussions related with social presence. The results show a characterisation of different aspects of social presence which allows us to draw profiles and patterns, which contribute to the understanding of the sense that the participants attribute to the learning task and their reactions in front of difficulties and advancements, as well as their contributions to the creation of a positive social climate for working together. From this socioconstructivist perspective, our results show empirical evidence which allows us to advance in the understanding of the role of the affective and emotional elements in virtual learning environments.

P 16
01 September 2007 11:00 - 12:20
Room: 0.100A
Paper Session

Multimedia and hypermedia learning

Chair: **Martin Ubani,** University of Helsinki, *Finland*

Designing hypermedia environments for learning with problems and cases: Contrasting and comparing systems in two domains
Michael Jacobson, Nanyang Technological University, *Singapore*
June Lee, Nanyang Technological University, *Singapore*
Seo-Hong Lim, Nanyang Technological University, *Singapore*
Lynn Sok Hua Low, Nanyang Technological University, *Singapore*

This paper discusses two studies in which two different hypermedia environments were developed that employed a similar set of theory and research based design features for scaffolding the learners, but in highly contrasting domains and for very different student grade levels. First, a brief discussion is provided of the main hypermedia scaffolding design features, such as inter-case explorations of hypermedia cases, conceptual mini-lessons (i.e., short lessons or explanations of important concepts or "big ideas"), and case-specific conceptual explanations. Study 1 explored how grade 8 students in Singapore collaboratively used a problem and case based hypermedia system to learn important health concepts related to diet and nutrition. It was found that lower academic ability students who used the hypermedia scaffolding performed significantly better on post test transfer problem than students who did not use the scaffolding, while also scoring at a comparable level to academically superior students in the control condition who read a printed version of the cases. Study 2, in contrast, involved university students learning advanced scientific ideas about complex adaptive systems with a hypermedia system that had similar design features as in Study 1. The data analysis for Study 2 is ongoing and is looking into issues related to conceptual change given complex system concepts are conceptually challenging and often counter-intuitive. The paper concludes with a consideration of theoretical perspectives on learning with contrasting cases and conceptual change and implications for the design and use of learning technologies such as hypermedia.

Control and interactivity when learning collaboratively from animation
Cyril Rebetez, University of Geneva, *Switzerland*
Mireille Betrancourt, University of Geneva, *Switzerland*

Learning from animated pictures is a cognitively demanding activity. Moreover, the literature reports many controversial findings regarding the benefits of animation over static graphics. Some studies demonstrated that giving the learners the control over the pace of the animation improved their understanding performance. One explanation is that learners can dynamically adjust the flow of information to their level of understanding. Another type of control is involved in simulations, in which the control is provided in the content itself. In simulations, learners' actions affect the information displayed rather than the pace and direction of a predefined animation. An experimental study was carried out to investigate whether the level of interactivity (animation vs. simulation) improved learning from multimedia instructions when studying alone or in group of two. No differences were found on comprehension performance in a post-test but participants

learning from a simulation took less time to study the material than participants learning from an animation. We concluded that a higher level of interactivity improved the efficiency of the multimedia instruction.

The effects of realistic detail in learning from dynamic visualizations
Katharina Scheiter, University of Tübingen, *Germany*
Peter Gerjets, Knowledge Media Research Center, *Germany*
Thomas Huk, Westermann Verlag, *Germany*

The study investigated the role of realistic and schematic dynamic visualizations for knowledge acquisition. Seventy-nine university students with little prior knowledge studied two dynamic visualizations on the process of mitosis before answering different types of questions that assessed learning outcomes. Both visualizations illustrated the same process and were accompanied by the same verbal explanations. There were four experimental conditions: In a realistic-realistic condition learners studied the same high fidelity dynamic visualization twice (i.e., movies recorded via a microscope). In the schematic-schematic condition mitosis was depicted by a dynamic series of simple line drawings, which were shown twice to students. In the schematic-realistic condition, students first saw the schematic dynamic visualization, which was followed by the realistic one. Finally, in the realistic-schematic condition this presentation order was reversed. The results showed that learners in the realistic-realistic condition answered fewer multiple-choice questions correctly, identified fewer errors in manipulated static pictures, and completed fewer partial static pictures correctly than learners in all the other conditions. This pattern of results was, however, no longer observable in the delayed posttest that was taken two weeks later. The results for the evaluation and cognitive load measures furthermore indicated that especially those students who had seen both types of visualizations rated the schematic visualizations as more helpful and reported lower task demands. Results of the study are discussed against the background of findings by Dwyer, who found that schematic static pictures were superior to realistic pictures only for specific tasks and under specific instructional conditions.

Do visual texts and pictures interfere in working memory?
Ralf Rummer, Saarland University, *Germany*
Judith Schweppe, Saarland University, *Germany*

A crucial finding in cognitive multimedia research is the so-termed modality effect (i.e., the finding that learning and memory performance is better when pictures are accompanied by auditory texts than by visual texts. Cognitive multimedia theories attribute this effect to an overload of visuo-spatial working memory in the visual text situation since visual texts and pictures are said to be processed (and stored) in the same subsystem. However, this view is not in line with common theories of working memory. In the present study we test another (though related) explanation for the modality effect. From literature on working memory we know that directed eye-movements hamper spatial rehearsal. As reading requires such directed eye-movements it is plausible to assume that eye-movements during reading (standard texts) decrease short-term memory for pictorial information as well which might lead to a modality effect. Our experiment tests this hypothesis by investigating picture recognition after hearing auditory text, reading visual standard text, or reading visual text presented word-by-word at the centre of the computer monitor. As expected picture recognition is worst in the standard reading condition (i.e., the only condition that requires eye-movements). The two other conditions lead to significantly better picture recognition but do not differ from each other. We discuss these findings with regard to cognitive theories of multimedia learning.

P 17
01 September 2007 11:00 - 12:20
Room: 0.83 Eötvös
Paper Session

Reasoning and problem solving

Chair: **Angela O'Donnell,** Rutgers, The State University of New Jersey, *USA*

The function of counterfactual thinking in academic context
Ana Cristina Quelhas, Instituto Superior de Psicologia Aplicada, *Portugal*
Csongor Juhos, Instituto Superior de Psicologia Aplicada, *Portugal*

Counterfactual thinking (CT) refers to the kind of thoughts that we have when we imagine how things could have happen in a different way. We usually have these thoughts when something undesirable happens, e.g. a student that obtains a poor grade in an examination might think: If I had studied more, I could have gotten a better grade. The aim of this research is to understand if students take advantage in their academic performance when they are prompted to think counterfactually. We analyzed, in a real life academic situation, the preparatory function of CT not only at an intentional, but also at a behavioral level. 304 students of the 1st year of psychology at ISPA (Lisbon) took a regular test in classroom situation. At the end, they corrected their tests under supervision of the lecturer and got grades. Afterwards they were invited to write down the thoughts they had about the situation, and to evaluate how prepared they felt for future similar situations. Then, they were induced to think counterfactually about what happened and again they reported their feelings of preparation. Finally, they were asked about future intentions in order to improve their performance. Control group followed the same procedure, except that they were not invited to think counterfactually. In general, counterfactual thoughts were of upward direction (78%), and of additive structure (70%). Results showed that the reported feelings of being more prepared to future similar situations, and to avoid a low grade, were higher after CT than before: $F(1, 181)=3,993$, $p=0.047$, and planned comparisons showed that this is a significant effect in the experimental group, but it is not in the control group. In a near future similar situation, we are going to evaluate if intentions for improvement were fulfilled, and if a better grade is obtained.

The importance of distinguishing 'dialogic' from 'dialectic' in studies of teaching and learning through social interaction
Rupert Wegerif, The University of Exeter, *United Kingdom*

This paper argues for the distinctive value of Bakhtin's concept of 'dialogic' in educational research using a combination of critical literature review, conceptual analysis and evidence from empirical studies of learning through social interaction. First the paper questions the intellectual coherence of the widespread synthesis of Vygotsky with Bakhtin, a synthesis often described as a dialogic theory of education. The paper argues that Vygotsky's application of dialectic theory to development treats the perspective of the other as a mediating means for the development of the self and for the development of knowledge structures. By contrast, it is argued, Bakhtin's dialogic begins by positing the irreducible difference of the other claiming that this is a pre-condition for meaning. Understanding, for Bakhtin, is not a cognitive structure but the reflective awareness that comes from seeing things from more than one perspective at the same time. The conceptual distinction between dialectic and dialogic translates to the pedagogical distinction between dialogue as a means for the construction of knowledge and dialogue as an end in itself. Two case

studies of pedagogical design are used to make the argument that, while dialectic can be used to teach explicit reasoning, teaching creative thinking requires dialogic.

The road to transfer: a concept - and a context approach in the secondary school subject of economics
Lenie Kneppers, University of Amsterdam, *Netherlands*
Carla Van Boxtel, University of Amsterdam, *Netherlands*
Bernadette Van Hout-Wolters, University of Amsterdam, *Netherlands*

In this study we investigated the effects of two treatments supplementing students' regular course in economics in pre-university education. Although students may have acquired a reasonable amount of conceptual knowledge as a result of economic courses, two deficits may prevent students from achieving transfer. One possible deficit is the lack of a rich and coherent conceptual network, whereas deeply understood and well organised domain knowledge is viewed as a prerequisite for achieving transfer. A second possible deficit is that students are hardly able to make connections between the acquired conceptual network and realistic social problems that can be looked at from an economic perspective. Both kinds of lacks results in low transfer-value of conceptual knowledge. In an experimental study we compared the effects of two instructional interventions, each directed to one of the assumed lacks, are compared. 139 high school students in economics participated, randomly assigned to one of the conditions: Concept and Context.. All students took a pre-test and two transfer tests. Students performed significantly better on the concept post test than on the concept pre-test. We did not find any significant differences between the two conditions on the tests. We discussed the feasibility of transfer in pre-university education

Promoting mathematical knowledge for teaching in teacher education: Two guiding principles for the design of mathematics tasks
Andreas Stylianides, University of Oxford, *United Kingdom*
Gabriel Stylianides, University of Pittsburgh, *USA*

This paper is situated in the emerging research discourse that focuses on what Ball and Bass call mathematical knowledge for teaching. The notion of mathematical knowledge for teaching denotes the distinctive form of mathematical knowledge that is useful for, and usable in, the work that teachers do as they teach mathematics to students. The research we report in this paper extends existing work on mathematical knowledge for teaching by considering the issue of theorizing how mathematics teacher education can effectively promote this specialized form of mathematical knowledge. Specifically, we propose and use empirical data to exemplify the utility of two interdependent principles for guiding the design of mathematics tasks that teacher education programs can use to help teachers develop mathematical knowledge for teaching. The combined application of the two principles produces a special category of generative mathematics tasks, which we call teaching-related mathematics tasks.

P 18
01 September 2007 11:00 - 12:20
Room: Konferencia
Paper Session

Self-regulation

Chair: **Alexander E. M. G. Minnaert,** Rijksuniversiteit Groningen, *Netherlands*

Epistemic beliefs and their relation to the application of learning strategies
Manuela Paechter, University of Graz, *Austria*
Sarah Müller, University of Oldenburg, *Germany*
Simone Manhal, University of Graz, *Austria*
Karin Rebmann, University of Oldenburg, *Germany*

Epistemic beliefs describe subjective concepts of knowledge and knowing in general or in specific domains. They, e.g., refer to ideas about the stability of knowledge (knowledge is stable or changes over time) or the structure of knowledge (knowledge consists of rather isolated pieces or of integrated concepts). Epistemic beliefs can be seen as implicit theories which influence an individual's learning behaviour, and thus may guide self-regulatory cognition and behaviour including the use of learning strategies. In an empirical investigation it was analysed how epistemic beliefs are connected to the use of cognitive learning strategies (rehearsal, elaboration, critical thinking, and organization strategies). 192 German speaking students with an average age of 23.87 took part in the study (66.85 % female and 33.15 % male students). All participants had in common that they took a course on learning and instruction. They filled in the SEQ (Schommer Epistemological Questionnaire) which measures epistemic beliefs and the LIST questionnaire which measures the use of learning strategies. Before analysing the linkage between epistemic beliefs and learning strategies the quality and dimensionality of the SEQ was to be investigated. A factor analysis with an orthogonal varimax rotation revealed two factors with satisfactory test criteria, structure and stability of knowledge. By canonical correlation analysis it was investigated how the two components of epistemic beliefs are related to the use of learning strategies. The two components were of different importance for the application of learning strategies. Stability of knowledge contributes to the application of all strategies. Students who assume that knowledge may change over time use all learning strategies more often. Structure of knowledge is mainly related to the use of rehearsal strategies. Students with less sophisticated beliefs, i.e., students who belief that knowledge is made up of rather isolated bits and pieces use the rehearsal strategy more often.

Redesigning prevocational education: parallel developments at the student, teacher and school levels during the first year of redesign
Karen Krol, University of Amsterdam, *Netherlands*
Annoesjka Boersma, University of Amsterdam, *Netherlands*
Anne Toorenaar, University of Amsterdam, *Netherlands*

Prevocational education in the Netherlands deals with students with motivational problems. This situation calls for a reconsideration of the instructional design on the basis of features distilled from the literatures of communities of learners: 1) shared learning, 2) meaningful learning (that refers to practices outside the school), 3) reflective learning, and 4) a focus on transferable learning outcomes. In the present study we pursue three aims: (phase 1, one year) contributing to the

conceptualization of the concept of communities of learners at the level of the classroom and the school, empirical validation of the operationalization of the classroom and the school as a community of learners for students and teachers, (phase 2, two years, cyclical approach) and the development and evaluation of instructional designs fostering communities of learners. In this paper we focus on phase 2, the designs that were developed in the first year of the two-year development process. The research questions that guided the present study concerned: · How were learning arrangements for classes designed in order to foster communities of learners that optimize student learning during the first year of design? · How did the school management stimulate or hamper the development of the classroom as a community of learners during this first year of designing? This paper attends to the design processes and the realised designs in terms of the distinguished features at both the school and the classroom levels, along with the development that occurred between the first and second design in one of the participating schools. A major development between the first and second designs concerned the degree to which shared and meaningful learning were promoted for students. The actions of the school management that school year clearly stimulated this development, by implementing structures that facilitated and stimulated the shared learning of teachers.

The quality of student teachers' self-regulated learning in a dual learning environment
Maaike Endedijk, Utrecht University, *Netherlands*
Jan Vermunt, Utrecht University, *Netherlands*
Perry den Brok, Utrecht University, *Netherlands*
Mieke Brekelmans, Utrecht University, *Netherlands*
Nico Verloop, Leiden University, *Netherlands*

Teacher education is more and more organized in dual learning programmes in which two types of learning environments are combined: studying at the university and learning from practice in schools. These programmes call upon a high degree of self-regulated learning in student teachers: they have to self-evaluate their competencies, clarify their learning needs, formulate personal development plans, document their learning progress in a portfolio, reflect on their learning, adjust their learning processes, combine knowledge gained from experience and university courses, and so on. Although these programmes require a lot of self-regulation from students, they do not necessarily develop desirable forms of self-regulation. This study examined the quality of student teachers' self-regulated learning in such a complex programme. Twenty-eight students of a post-graduate academic teacher education programme participated. To measure the quality of self-regulation three instruments were used. First, student teachers were interviewed about the way they regulated their learning in their normal studies. Secondly, they were asked to describe six different learning experiences and corresponding regulation activities on a weekly basis in an open question log. Thirdly, the portfolios student teachers had to complete in their programme were also used. These data sources were analyzed in a phenomenographic way, followed by homogeneity analysis. The results indicated that qualitatively different approaches to self-regulated learning to teach could be identified. A limited number of categories of description were developed that reflected the core of these approaches. These descriptions differed significantly from the accounts of self-regulated learning found in academic student learning contexts. Combining learning from experience with learning from university courses turned out to put special demands on the nature and quality of self-regulated learning that students were not used to cope with. Possibilities to improve the development of student teachers' self-regulated learning in these complex learning programmes will be discussed.

The development of self-regulated learning based on enrichment of goals, self-efficacy and attributions
Éva Molnár, University of Szeged Department of Education, *Hungary*

Transformations in the concept of knowledge have resulted in relevant changes in the concept of learning during the last decades. New concepts of learning have a focus on the intentional and self-regulated nature of learning. Many investigations have shown that the level of self-regulated learning decreases with age. This means that younger students use more and more efficient learning strategies and have a higher level of learning motivation. Our training program aimed at measuring 5th and 9th grade students' self-regulated learning, and at developing intentional and self-regulated learning by means of enriching aims, self-efficacy, and attributions. The sample consisted of 5th and 9th grade students from 12 schools in an urban environment (N=435). The training program addressed various components of self-regulated learning such as learning styles, learning strategies, learning motives, goals, self-efficacy beliefs, and attributions. The results show that due to this short training program, in the experimental group the level of self-regulated learning remained constant, while in the control group we found a significant decrease among the 9th graders. Parallel with this, students in the experimental group showed that they can make concrete goals, and they can successfully complete tasks according to the level of self-efficacy. In addition to this, data shows that the experimental group enjoyed learning more, and engaged in more planned and regulated learning.

P 19
01 September 2007 11:00 - 12:20
Room: 1.60
Paper Session

Lifelong learning and professional development

Chair: **Denise M. Whitelock,** Open University, *United Kingdom*

Work-integrated learning in educating for the healthcare professions
Hans Rystedt, University West, *Sweden*
Jan Gustafsson, Department of Education, Göteborg University, *Sweden*

The gap between higher education and work is often referred to as an obstacle for learning proficient work performance. To overcome this problem, a workplace-based alternative to a three-year nursing education programme was initiated at University West in Sweden. All of the modules in the program, including the theoretical ones, were carried out within or adjacent to clinical settings. In comparison to a traditional curriculum, the borders between theoretical studies and participation in caring activities were radically diminished. The work-integrated programme was organized around a pre-determined set of themes instead of traditional theoretical disciplines. In accordance with a PBL-design (problem-based learning) each theme involved groups of students in delineating a problem, identifying the needs for additional knowledge to solve it, organising the new information, and, finally, evaluating the learning process. The programme was based on real-life problems deriving from the close clinical practice and with the purpose of covering the content of different themes. Data about the educational activities were collected through interviews with students and tutors, observations and video-recordings, as well as an analysis of the documents

produced. The results point to several critical aspects that have to be considered further if work-integrated learning as an educational concept is to meet the demands of a comprehensive integration of theory and practice. Integration, on an organisational level, is not sufficient for managing the tensions between a thematic and a discipline-based structure at a content level. It is argued that the emphasis on autonomy and self-directed learning pervading much PBL-research often overlooks the question of how the learning content is dealt with in instruction. Instead, an approach is suggested for studying and designing learning environments that focuses on how the realms of education and work are utilized as resources in the students' interactions with a more experienced tutor.

Knowledge of experts and novices in the field of entrepreneurship
Barbel Furstenau, Dresden University of Technology, *Germany*
Iris Trojahner, Dresden University of Technology, *Germany*

Entrepreneurs are assumed to be essential for modern economies in order to assure economic growth and positive impacts on employment. In order to help to-be entrepreneurs learn necessary professional and personal skills, courses and curricula have to be developed. These curricula should be sensitive to prior knowledge of participants and lead to expert knowledge. In light of these considerations we conducted a study aimed at evaluating the knowledge of experts and novices about successful entrepreneurship for the long-term viability of a copy company. The experts and novices were requested to draw their knowledge as a concept map with named concepts and named arrows (relations) between the concepts by using paper and pencil. The data were analysed by using a categorical and a structural content analysis. As a result we obtained modal concept maps, which represent the knowledge of groups of test persons both in terms of structure and of content. The comparison of the experts' and novices' modal concept map reveals that the experts' knowledge is more differentiated and integrated than that of the novices. With regard to the content the novices disregard the importance of the personality of the entrepreneur (e. g. values, expectations, aims) and his/her influence on employees as well as on customers whereas this connection is emphasized by the experts. Furthermore the experts focus on a long-term perspective for the company in the sense that they regard net assets, finance issues and investment whereas the novices take into account a selection of short-term factors that cause expenses. These findings define a starting point for the development of new curricula and the evaluation of existing curricula.

Collaborative technologies in education research: a study of the implementation of Virtual Research Environments in three UK projects
Vito Laterza, CARET, University of Cambridge, *United Kingdom*
Richard Procter, CARET, University of Cambridge, *United Kingdom*
Patrick Carmichael, CARET, University of Cambridge, *United Kingdom*

Education researchers are showing growing interest for Virtual Research Environments (VREs). VREs support research among geographically-distributed institutions, allow for collaboration outside the formal spatiotemporal coordinates established at workplace level, offer viable solutions for research data storage and act as integrated spaces for different research-oriented software tools. The aim of this paper is to explore some of the factors that facilitate or inhibit a successful implementation of a VRE for collaborative research work. The empirical data are drawn from a long-term evaluation of three UK education research projects. Our findings suggest that the nature of the research project, budgetary resources, the history of collaboration among participating researchers and institutions, project management practices, and the development of effective

brokerage between users and developers all contribute to the shaping of patterns of user engagement. Each project used a particular combination of the available tools and the same tools were used differently in different projects. The findings suggest that a responsive approach whereby the processes of VRE development and implementation go hand in hand is needed, and we discuss the role of evaluators as brokers between users and developers. Further theoretical and practical challenges are posed by the inherently ambiguous nature of project work: our focus on the personal and institutional dimensions of collaboration has brought to light a complex picture of formal and informal relationships within and beyond project boundaries. Any successful implementation of a VRE will depend upon an appreciation of these social realities. This analysis has important implications for the implementation of VREs supporting EU-wide education research projects. While VREs offer obvious advantages to such research settings, researchers, research managers and practitioners should be aware of the complexities involved in the process of development and implementation and be prepared to adapt working practices accordingly.

Peer coaching in a professional development program using video feedback
Rita Schildwacht, Fontys University of Professional Education, *Netherlands*
Sanneke Bolhuis, Fontys University of Professional Education, *Netherlands*
Jan van den Akker, University of Twente, *Netherlands*

Our research aims to formulate design guidelines for stimulating teachers' professional development using video feedback in collaborative settings. The study focuses on video feedback in peer coaching settings and investigates a setting with three roles (trainee, coach and observer). We are interested in the importance of coach training, and the influence of role-taking on the ownership of learning goals. A scheme incorporating three roles and coach training was developed for stimulating professional development of teachers in a school of secondary education. The study explores the coach's roles that are beneficial for the learning process of their peers and seeks to understand how watching video records of own practice, supports teachers to examine their own professional behaviour in new ways. Data for this study includes videotaped and transcribed subgroup dialogues and, for triangulation, data from learning reports, audio tapes and observational notes of the training sessions, questionnaires, and in-depth semi-structured interviews with all participants. Coaching in a setting with three well defined roles (trainee, coach, observant) proved valuable. The coach role was very important for the depth of the reflection process. Non-directive coaching skills created necessary safety and space for learning, but more directive coaching skills such as 'Continue to ask questions' were necessary to deepen the reflection process from more descriptive and perceptive reflections to more receptive, interactive and critical reflections. In the dialogues the participants reflect on practice, on context, on values, and on improvements. Working with (peer) observers of the coaching dialogs improved performance and forced the group to take their roles more seriously. Coach training proved to be essential. Also essential for the scheme to work is a high degree of equality between participants.

P 20
01 September 2007 11:00 - 12:20
Room: 0.89 Jedlik
EARLI Invited Expert Panel Discussion

Scientometrics as the quantitative self-reflection of the social sciences

Chair: **Benő Csapó ,** University of Szeged, *Hungary*
Presenter: **András Schubert ,** Hungarian Academy of Sciences, *Hungary*
Discussant: **Erno Lehtinen ,** University of Turku, *Finland*
Discussant: **Roger Säljö ,** Göteborg University, *Sweden*
Discussant:**Wolfgang Schnotz ,** University of Koblenz-Landau, *Germany*

Scientometrics in its broadest sense covers all quantitative aspects of the study of scientific and scholarly activity. Its primary interest is in the structural and dynamical analysis of sets of authors, publications, citations, etc. The notorious evaluative aspects are just one of the possible fields of application.

Since scientific and scholarly research are unquestionably social activities, their study should be categorized into the social sciences, even if some of its concepts and methods are borrowed from the harder sciences. On the other hand, social sciences as a form of scientific and scholarly activity, is a legitim target of scientometric studies. As a result, scientometrics offers a unique possibility for self-reflection: the quantitative way for social science to study itself.

Social sciences as compared to most areas of sciences, has certain handicaps as targets for scientometric studies. Just to mention a few: because of a relatively high percentage of single-authored works, co-authorship networks are less definite; language and cultural barriers inhibit more markedly the formation and use of a common knowledge pool; the number and even the function of references vary rather widely among the different disciplines, etc. These features make the scientometrics of social sciences challenged but by no means disabled. Not only one of the earliest pioneering attempts of sceintometrics concerned with a social science discipline (psychology), but both structural and dynamical, as well as evaluative scientometrics of social sciences are amply represented in the most recent literature.

In this presentation some typical examples of scientometrics analysis and evaluation techniques will be shown on the model of the papers published in a set of social science journals. Analysis of author networks, publication and citation dynamics, as well as macro-, meso- and micro-level evaluative techniques will be illustrated, and some comparisons with earlier results and with similar characteristics of science fields will be made.

KN4 1
01 September 2007 12:30 - 13:30
Room: Konferencia
Invited Paper

Prevention of reading difficulties

Barbara Foorman, Florida State University, *USA*

Chair: **Cordula Artelt,** Otto-Friedrich Universität, *Germany*

During the past few decades reading research has highlighted correlates and causes of reading success as well as reading difficulties. Learning to read entails normally developed language skills, knowledge of phonological structures, knowledge of how written units connect with spoken units, phonological recoding and fluency, and print exposure. Neurological, familial, socioeconomic, and instructional causes will be discussed as candidate causes of reading difficulties. Central points are that (a) brain activation patterns can change as a result of effective intervention, (b) genetic and environmental factors share the variability in reading disability, (c) instructional factors are often underestimated as a cause of reading difficulties, and (d) the emphasis needs to be on prevention rather than remediation. Research on effective early reading instruction at the classroom level and at the level of intensive, pull-out interventions will be provided and the challenges of scaling will be discussed. Concluding comments will emphasize the importance of systemic, multi-tiered approaches to preventing reading difficulties in school settings.

KN4 2
01 September 2007 12:30 - 13:30
Room: Harmónia
Invited Paper

Understanding rational numbers

Terezinha Nunes, University of Oxford, *United Kingdom*

Chair: **Erik De Corte,** University of Leuven, *Belgium*

Research on rational numbers shows that students face two distinct types of challenges. First, they are confronted with quantities that involve a relation between two other quantities: therefore, their previous conceptions regarding how transformations change quantities are challenged. For example, if one cake is being shared by three children, and one more child comes, the increase in the number of children results in a decrease in the quantity of cake that each one receives. Addition, previously conceived as increasing quantities, can result in decreasing quantities in the domain of rational number. But it all depends on which quantity is increased: if there is one more cake to be shared, then each child will get more. Finally, because the quantity that each receives is a relation, if there is one more cake and three more children, there is no change in the amount that each child receives. A complex set of understandings, involving reasoning about direct and inverse as well as proportional relations is required when students think about these quantities. The second challenges come from the numbers used to represent these quantities. Natural and rational numbers represent quantities differently. There is a one-to-one correspondence between natural numbers and the quantities they represent. In contrast, because of the relational nature of rational numbers, different numbers may represent the same quantity (1/3; 2/6; 3/9 etc) and the same number might represent two different quantities (1/3 of 12 1/3 of 24). The density of natural and rational numbers also differs: there is only one natural number between 2 and 3 but there are infinite rational numbers. These differences led many to wonder whether it is possible to identify informal knowledge of rational numbers, learned outside school. This presentation will consider the case for informal knowledge of rational numbers, its nature and development.