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ABSTRACT

This study reports on the contradictions between the motive orientations of teachers and preschool children when digital animation was introduced in 3 preschools (103 children M age = 3;8 years, 4;2 years, and 5;0 years, respectively; n= 371 hr of video). The findings suggested that new psychological conditions are created during digital play; differing motive orientations of children and teachers appear to have a bearing on how children pay attention to, or engage with, the learning goals set by the teacher; and higher levels of negotiation are required in contradictory contexts of motives for learning or play.

Introduction

Despite the growing number of studies in the area of digital play (Young et al., 2012), the role of digital play in educational contexts is not yet fully understood (Linderoth, Lantz-Andersson, & Linderstrom, 2002; Marsh, Plowman, Yamada-Rice, Bishop, & Scott, 2016). The present article seeks to contribute to this literature by reporting on the findings of a study that examined how children in free play settings negotiate with one another and their teachers and how they interact with digital devices when using a software tool called *slowmation* (Fleer & Hoban, 2012), a simplified form of stopmation animation (abbreviated from "Slow Animation") that brings together photographic images that children have taken of a play scene. The photographs are merged together so that they become animated. Children can narrate the animation so that it becomes a movie of the objects in their play space (see examples at www.slowmation.com; Hoban, Loughran, & Nielsen, 2011).

The study had two related goals; First, it sought to capture the dynamic between digital play and the learning contexts of using slowmation, where children need to learn how to use the software tool to successfully role-play in digital form and to negotiate with one another socially and technically. Second, it aimed to determine the kinds of demands that preschool children and teachers meet when a digital device (iPad) equipped with a digital tool (slowmation) is introduced into free play time. It is in these contexts that contradictions emerge between teachers wanting to teach children how to use the slowmation and children wanting to play. As such, the study sought to understand the motive of children and teachers and how they negotiate with each other during the process of using digital tools in free play settings.

In existing studies that provide the background for the present research, three key research outcomes are evident. First, what is known about children's engagement with technologies is based mostly on parents' self reports from family contexts (Stephen, Stevenson, & Adey, 2013), with less known about the digital play of preschool children in free play settings (Gibbons, 2015). With a few exceptions (e.g., Plowman & Stephen, 2005), attention has not been paid to children's group interactions in preschool settings where teachers have an educative agenda. These contexts are

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likely to be different, and as such more needs to be known about how the introduction of digital devices and tools designed for educational purposes create new conditions for children's play, as well as how children appropriate the teacher's agenda for learning.

Second, previous work relied upon examining the relations between digital play and real-world contexts (e.g., Johnson & Christie, 2009). For example, previous research examained the opportunities afforded for peer play by games software. This work found that some software programs support peer play (Verenikina & Kervin, 2011). However, a lot of software is structured, and this makes group interaction difficult (Moore, 2014). In these situations children change the game structure of the software to support peer interaction (Moore, 2014; Wohlwend & Kargin, 2013), leading to the examination of whether or how children change the way they use software to enable peer play.

In addition, research on preschool children's use of games software indicated that children engaged with the characters in the software as if they were real, to re-cycle the game character talk in their interactions with each other, and to follow instructed actions (Björk-Willén & Aronsson, 2014). However, these findings emerging from games research may not apply to software tools such as slowmation. Therefore, investigating software tools, such as slowmation, rather than games potentially yields different insights into the new play conditions created through the introduction of these tools and the new learning situations introduced by the teacher.

Third, little is known about the range of demands made upon children when confronted with software tools such as slowmation. What is known about the use of slowmation in preschools comes from a single case study that examined the demands made upon children when introduced to slowmation in free play settings. It was found that children's motive for play and their motive for learning appeared to matter for how they interacted with the digital device (Fleer, 2014a). When children's personal motive orientation was to learning, they paid closer attention on how to make an animation. However, when their personal motive orientation was for play, they used the objects to engage in object play. That is, the same activity setting was being interpreted differently based on the children's motive orientation (see the upcoming section The Social Situation of Development). However, this study did not examine the range of possible demands on groups of children across preschool contexts where slowmation was being used for digital role-play. It also did not examine the demands made upon teachers through introducing slowmation to children in free play settings. Therefore, further research is needed if we are to better understand if and how this new form of digital role-play creates demands upon young children and teachers, and how they deal with it.

Basically, then, the relevant previous research has foregrounded the activity context of introducing digital devices, and the institutional practices of the home and/or preschool, but has not focused on how play and learning are intermeshed when children in free play settings learn to use a slowmation for digital role-play. Therefore, the present study described how children and their teachers in three preschools interacted with one another and their teacher and with digital devices in organizing their play and learning when using a software tool called slowmation. A playworlds approach was featured (Lindqvist, 1995) for supporting role-play and the associated science activity through photographing and animating a fairy tale.

Theoretical concepts informing the study

The present research draws on a cultural-historical system of concepts to support a holistic framework for the study of the social dynamics and relations of the children, the digital device, and the free play setting of a preschool. The study uses a cultural-historical conception of play, social situation of development, and motives, with the purpose of examining the demands that children and their teachers meet in preschool settings when they engage in digital role-play with animations of fairy tales during free play time. These three concepts are discussed in turn.

A cultural-historical conception of play

The conceptualization of play that has guided this study foregrounds the creation of an imaginary situation where children change the meaning of actions and objects, giving them a new sense in their effort to understand an experience of affective-cultural significance. For example, when children use a stick as a horse they do so with the purpose of role-playing an experience such as riding a horse that they cannot do in real life. As such, in play objects act as a pivot to support children's imaginary play (Vygotsky, 1966).

According to Vygotsky (2004), children draw from everyday life the themes and symbols of their play. Because of this, in such play as enacting social roles, children move closer to reality because they explore the rules and roles of society in their play, coming to better understand the cultural practices of the world in which they live (Elkonin, 2005; Vygotsky, 1966). However, this cultural-historical view of play does not address how roles depicted in technology become a part of children's play, and their developmental functions. Based on the idea that children's play symbols come from children's cultural experiences, the present study aimed to extend the cultural-historical conception of play to find out how tools such as slowmation can support new forms of play.

The present effort to examine whether or how slowmation becomes a part of children's play gains further support from current expansions of Vygotsky's theory. Göncü, Jain, and Tuermer (2007) made reference to play as a cultural form of expression in which children use tools that are specific to their local context in representing their realities. For example, children may use musical and linguistic tools just as easily as objects in representing their cultural experience. This view opens up possibilities for conceptualising and studying digital play with slowmation software as a form of cultural expression in that slowmation provides both the new content and the symbols for children's play. Indeed, the relevant literature just reviewed suggest that children do engage in social pretend play with and around software, but little is known about what happens with slowmation when it is introduced into children's play environments. Understanding how children change the meaning of objects and actions, and play out the roles and rules of society through digital tools such as slowmation is not yet fully understood. As well, how programs such as slowmation create new contexts for the development of valued motives and competencies for play are not known. The present study was designed to address these concerns.

The social situation of development

The social situation of development captures "*the relationship that exists between the child and its environment*" (Vygotsky, 1994, p. 341). This concept makes it possible to examine "how a child becomes aware of, interprets, [and] emotionally relates to a certain event" (Vygotsky, 1994, p. 341). Key here is the unity between person and environment where what the child brings to that interaction, such as his or her motive orientation, determines how that interactional experience is understood or interpreted. Bozhovich (2009) conceptualized this relationship as a complex dialectic. As an extension, the concept of the social situation of development foregrounds the present study so that both the child's motive and the preschool play environment can be studied as a relational and dynamic whole.

With its focus on the unique involvement of each child with his or her environment, the notion of social situation of development enables researchers to consider why and how children regularly "understand (perceive, conceptualize) one and the same event in different ways" (Vygotsky, 1994, p. 67). Vygotsky introduced this concept to show how three children from the same family who had a single mother with a substance abuse problem each brought to this same family situation their own social situation of development. The youngest child was unable to understand the situation and was traumatised by the experience. However, the older child could, and took on the role of the adult, looking after the other children and their mother. Each child interpreted the same family situation differently based on their own personal social situation of development. This concept is helpful for

the present study into digital play, because when children in the same educational situation are introduced to creating a slowmation, it is possible that each child will give different meanings to the same activity and therefore "will experience it differently" (Vygotsky, 1994, p. 67) even though the teacher has created one common activity. In line with Hedegaard (2012), it can be argued that a child with a personal motive for play or a child with a personal motive for learning will engage in the same digital activity setting differently.

Studying the digital environment and the children's motive orientation is necessary in research that seeks to examine the nature of digital play in play-based settings. By drawing upon the concept of the social situation of development in collective play contexts, such as preschools and child care centres, we are more likely to create a holistic conception of the research, because it brings into focus the social dynamics and intersubjective relations of the children, the digital device, and the free play setting of a preschool setting where the new conditions have the potential to create new demands upon children, as well as their teachers.

A cultural-historical conception of motives

A cultural-historical conception of motives focuses on the contextual conditions under which children's motives develop. This study drew upon Hedegaard's (2012) conception of a *motive orientation*. In the present case, motive orientation describes how teachers create new conditions for children that will orient their participation in slowmation. This was done for two purposes. For one, through examining a child's motive orientation toward role-playing with slowmation, greater insights into how children interact with one another and with the digital tools can be obtained. Second, motive orientation can also capture the difference between an institutional motive for learning and a child's personal motive to play or learn. Possible contradictions will create new demands between children, but also between the teacher and the children who do not have a learning motive. Through this study of motives where intentionality of the child and the institution may differ, it becomes possible to analyse the dynamics between the child (what she or he pays attention to) and the environment (what the teacher wants the child to pay attention to). In the present study, this dynamic situation is conceptualized as a relation between the institutional demands (e.g., curricular agenda) and the personal motive of the child (e.g., play) within the particular concrete and social setting where digital play is being introduced.

When the theoretical concepts of the social situation of development, motives, and Vygotsky's conception of play are brought together in the context of the broader digital play literature, it becomes possible to study holistically the practice of digital play and learning in relation to one another. As such, it is expected that a cultural-historical reading will give new insights into the demands that are made on children and teachers when they use a slowmation tool to create an animation as a digital role-play.

Method

Participants

Three centres with a total of 103 children from 3 to 5 years of age participated in the study. In Centre 1, three teachers and 53 children (age range = 3;3–4;4, M = 3.8 years at the start of the study) from a middle-class community near a major city in Australia participated in the study. The children were from European heritage families, the vast majority from Anglo-Australian families, but a few had central and northern European backgrounds. In Centre 2, two teachers in a preschool room with 20 children (age range = 4;6–5;7, M = 5.0 years) participated. The preschool is located in a city in Australia where children from Anglo-Australian, African, Filipino, Indian, South Sudanese, Nepalese, and Vietnamese heritage families attend. A social mix of middle-class and newly arrived families from Asia live in the community. One of the

teachers, who is fluent in Vietnamese, supports the bilingual program of English and Vietnamese. In Centre 3, two teachers and 30 preschool children (age range = 3;3–5;3 years, M = 4.2 years) participated in the study. The children were mostly from Anglo-Australian backgrounds, with few children from different African, North American, South Asian, and European backgrounds.

Ongoing teaching program and procedures

This work came out of an effort to understand the relations between play and science learning in preschool settings (Fleer, 2011). As part of this effort, all three centres incorporated a mix of free play and learning activities into their programs embedded in slowmation. The teachers in all the centres received professional learning in relation to the use of slowmation on an iPad for supporting science learning and were supported in the development of a unit of science drawing upon a fairy tale in which the pedagogical model of playwords featured (Lindqvist, 1995). The playworlds approach is designed so that the adult and children jointly create imaginary situations, usually following a known fairy tale or children's book. The adult takes on a character in the play narrative, and the playworld of the fairy tale or the book is expanded to include adventures.

In each preschool, the teachers introduced the slowmation activity to the children by saying that they would be making a movie of their fairy tale on the iPad. The teachers initially introduced the fairy tales that are familiar to children by first reading the story, then telling the story using props, and finally by asking the children to enact the fairy tales at group time and during free play time. A table or a corner of the preschool was set up with the fairy tale props for the children to use. This play space was captured digitally on an iPad or a camera by the childen, initially with support from the teacher or a research assistant and later independently by children themselves where they did not need assistance. During free play time the teachers put the iPad on the table and assisted the children both in the retelling of the story and in taking photographs of the role-play. The interactions between the teacher and the children, and between the children as they collaborated together (or not) during the process of negotiating the purposes of the activity, were filmed as part of the research. Teacher assistance, peer-to-peer assistance, and research assistant support were documented during the process of introducing the activity, as children came and went to the activity, and over multiple free play sessions.

The teachers had no prior experience in using slowmation, but had experience in using computers. To our knowledge, the children did not have any prior experience with slowmation either. However, a small amount of computer use in the centre with the children was evident for two of the three centres studied.

Video observations

The teachers and children were followed over 3 to 8 weeks as they interacted or negotiated with each other the purposes of the introduced activity of slowmation, resulting in 371 hr of video observations. The unit of work that featured science and slowmation varied between centres depending upon the complexity of the teaching program and the children's interest. Video observations were made using a roaming camera that followed the children in the preschool as they played and as they engaged with the activities set up in the centres. A second camera mounted on a tripod was placed near the slowmation and role-play areas in each centre. Two cameras enabled capturing close-up and long shots of free play time in the preschools. Both cameras had directional microphones, and the filming was supervised to ensure that children engaged in slowmation creation during free play time in the centre were captured.

Data analysis

Drawing from the work of Hedegaard (Hedegaard, 2014; Hedegaard & Fleer, 2013), the data were analyzed both with children's perspectives (i.e., motive orientations) and institutional perspectives in mind, for examining the movements *within* each social and concrete setting where an iPad and movie-making software (slowmation) were introduced in all three centres. An analysis of the relations between an institutional motive and a child's personal motive during the negotiated activity was achieved through a three-phase protocol. This three-phase protocol (upcoming Level 3 section) was undertaken after the video observations were logged and organized (upcoming Level 1 and 2 sections). The process with examples is shown next.

Level 1 organisation of video data—logging

Data logging involved a two-step process of initial logging of all the raw video data as video files (file number, date, time, minutes, camera number, research assistant present, written summary of what was in video file) and then including a brief description of the content for each time series.

Level 2 organisation of video data—video clips

All raw data were tagged and reduced into a series of video clips in relation to specific activity setting, such as group time, table activities, and iPad use. This involved identifying start and finish of relevant activity settings. Video clips were partially transcribed and labelled (e.g., 34:35–35:10 Role-play of Jack and the Beanstalk). All video clips were then clustered and put into folders (e.g., *role-playing a fairy tale* project). Inclusion criteria for the activity settings related to fairy tale (e.g., role-play; story telling and retelling; drawing associated with fairy tale), and the use of the iPad and the making of the slowmation (iPad use, digital audio recording of the fairy-tale narrative). Other activity settings, such as snack time and transitioning into preschool, were not included in the analysis because they were outside of the goals of this particular study.

Level 3 interpretations of video clips

The interpretion of the video clips followed Hedegaard's (2008) analytical framing involving three steps. First, through an iterative process of tagging, how a particular child enters into the activity setting and plays with the fairy-tale materials in the process of making a slowmation in each setting was noted. Second, going beyond individual video clips of individual activity settings, if the content identified in each setting was also evident across videos clips was determined. Third, children's approach to the activity was studied using the concept of the social situation of development (how child appeared to be experiencing the activity, their intentions), differences in their approaches were studied in relation to the concept of motives (i.e., to play or to learning), and the activity setting was studied to see what kinds of institutional demands were being made on the children through looking at the intentions of the teacher (e.g., to make a slowmation and to role-play a fairy tale). Due to space limitations only a general description has been given. For further methodological details, see Hedegaard and Fleer (2008).

Findings and discussion

The central findings are discussed next under the section headings digitally Supported Imaginary Situations, New Demands, and The Relations Between Motives and Demands to show the nature of play and learning that were created through introducing digitally supported role-play across the three preschools.

Digitally supported imaginary situations

The analyses revealed that the digital technology changed the nature of the children's imaginary play, because the children used a digital audio recorder and props to document their role-play when

creating a slowmation, as is shown in the following example taken from Site 2 where the *Three Billy Goats Gruff* was role-played.

> Four children and the teacher are in a room adjacent to the main preschool room. They have placed a low coffee table in the middle of room to act as the bridge. Simon (4;8 years) is crouched under the table acting as the Troll. Cynthia (3;6 years), Kerryn (5;2 years), and Anamika (5;6 years) are grouped together at one end of the table ready to role-play being the goats to cross the bridge. Kerryn, who takes on a directing role, says to the teacher, who is holding the digital audio recorder, "Tell me when to go ok?" The teacher then signals she has turned on the digital audio recorder.
>
> Simon : What was that … who was that tiptoeing on my bridge?
>
> Cynthia : It's only me (squeaky voice)
>
> Simon : Big Billy goat?
>
> Cynthia : The little Billy goat
>
> At this point, Kerryn whispers the word "gruff" to Cynthia to prompt her to complete the full sentence of "The little Billy Goat Gruff." Cynthia immediately responds by saying, "Gruff." Simon in the role of the Troll says, "I'm going to eat you." Cynthia responds by saying, "Please don't eat me I'm only skin and bones." Kerryn whispers the next line to Cynthia, which she repeats by saying, "My brother is going to come and he's much bigger than me." Simon (Troll) says "OK" and allows the Little Billy Goat (Cynthia) to cross over the bridge (table). Kerryn turns to Anamika and says, "Now your turn." Kerryn continues to direct the play by supporting each child in role, as she looks both to the digital player held by the teacher and the children who are in their roles. On cue, Kerryn also takes her turn as the big Billy Goat Gruff and completes the role-play (RD 12 29 17:16).

Digitally recording the narrative of the *Three Billy Goats Gruff* put a new demand upon the children in their role-play. Rather than simply acting out the story, the children had a personal motive for re-presenting the story line as a narration that was to be used to support the making of their slowmation. As such, the children were surreptitiously prompting each other to achieve an accurate representation. By digitally recording the narration of their role-play, children used the digital narrative as a placeholder for the fairy tale. As the preceding example shows, the children appeared to be simultaneously inside the play acting out the fairy tale while thinking about the role-play as a digital production to be played on a digital device, as was the purpose of the activity. The digital recording of the role-play adds complexity to the children's role-play because they needed to both imagine the story line of the *Three Billy Goats Gruff* while imagining the scene they were creating in action with the corresponding narrative that they were digitally recording.

In the transcript that follows, we see how the children name the digital recording of their role-play as a "practice," supporting the idea of a digital placeholder (Fleer, 2014b).

Cynthia, Kerryn, Anamika, and Simon have just finished role-playing the *Three Billy Goats Gruff*. Kerryn turns to the other children and says, "OK, that was just a practice." Simon and Cynthia both look to the teacher and digital audio recorder and also say, "OK, now that was just a practice." The teacher asks the children, "Now do you want to listen to your practice?" The children immediately gather around the digital audio recorder, listening to their performance and laughing; Anamika jumps up and down on the spot in excitement as she listens, and Kerryn turns to Anamika and kisses her, as the recorder plays their voices: "I'm only skin and bones … my brother is coming and he's much bigger than me…" (RD 12 29 22:37).

The digitally produced audio recording of the play, which was to be used later by the children as the voice-over for their digital slowmation movie, was reviewed by the children, and through this the recording acted as a digital placeholder for their play. The children also referenced the term "practice" in order to make clear to one another the specific purpose for digitally recording their role-play, thus supporting the idea that the digital device and slowmation together act as useful tools to support children's collective re-creation of the fairy tale. Digital play as described here appears to capture both the process of audio recording the role-play and imagining of animated images. These

findings expand Vygotsky's original conceptualization of imaginative play because the digital recording of play introduces an additional layer of play complexity. What is captured on the digital device can act as a digital placeholder of the role-play. Digital representation can serve the role of acting as a new form of the idea of the object or action. But also, a digital tablet can act as a cultural device where the object (e.g., an iPad) can change the meaning of the action (e.g., practice). In this sense, the digital tablet and slowmation can together also serve as a virtual pivot to support the new play practices. During Vygotsky's time, digital devices suitable for young children had not been invented. *Digital placeholder* and *virtual pivots* are useful terms for capturing the new play practices, and this opens up new conceptualisations of play that need to be considered when describing the practices that have emerged when digital tools are introduced into free play settings.

New demands

As was expected, the introduction of *slowmation* in the preschool environments during free play periods placed new demands upon the children. The main categories of demands taken from the full data set across the three sites studied were technical, conceptual, and social; examples of these follow. The social situation of development helps explain these findings.

It was expected that the technical use of the slowmation software would dominate children's activity. However, during free play time, it was most difficult to conceptualise the story line and to coordinate the placement of the desired object into the field of view of the camera and to take the photograph in the right sequence. In the following example, Annabelle and Timothy's intention is to make their movie of the *Three Billy Goats Gruff*. To do this accurately, the children needed to continually check the play scene and the image on the screen, prompting each other to wait before pressing the camera button.

> Annabelle moves to the play table and places a plastic Billy Goat at the middle of the bridge. A Troll is positioned below the bridge and two Billy Goats are placed waiting at the foot of the bridge. She moves back to the table where the iPad is located and looks at the screen to see if the scene at the table is captured on the iPad. Timothy looks on, but follows actively what she does, observing the play scene on the table and the image on the iPad, appearing to wait patiently as the scene is photographed (RD 12 14 17:24).

As with the role-play discussed previously, the children needed to simultaneously remember the story line of the fairy tale and imagine the fairy tale as an animated movie. The objects have to be placed carefully so that small animated steps could be captured with each click of the iPad camera button. This is a new demand that the children needed to meet to successfully create a digital role-play of the fairy tale as a series of moving images.

The study also found that there were many social demands made upon the children because of the need to coordinate the different intentions of the children when using the iPad during free play, as becomes evident in the interaction of Annabelle and Timonthy stated next. For instance, Annabelle is systematically moving the Billy Goat and photographing it while stopping Timothy from prematurely pressing the camera button on the iPad.

> As Annabelle moves from the play table to the iPad, Timothy says, "Get a troll up," indicating that he wishes to take a photograph of the Troll interacting with the small Billy Goat Gruff, who is now on the bridge. Annabelle smiles at Timothy as she presses the iPad button to take the photo and says, "Now wait." She then goes back to the bridge and moves the Billy Goat one step forward. Timothy impatiently repeats, "Get a troll out. I said, get a troll out." Annabelle replies with a smile, "Now wait. Yes. Wait." (RD 12 14 31:50).

Annabelle, in coordinating the real scene and the virtual scene in the context of creating a series of moving pictures, was also managing the social scene by stopping Timothy from pressing the camera button. Annabelle was coordinating the technology and orchestrating Timothy so that she could successfully make an animated motive of the fairy tale. Annabelle needed to ensure that Timothy was also imagining the same digital role-play so that the camera button could be pressed at the right moment.

Engaging in creating social pretend play in digital form with a play partner requires different forms of negotiation than when engaged in role-play generally. "Get the troll up" and "Now wait" were statements used to negotiate as both children were moving inside and outside of the imaginary situation, but in this case in relation to the digital production of the role-play. This example illustrates three types of demands—technical (i.e., successfully using the iPad and slowmation software), social (i.e., coordinating the photographing with another), and conceptual (imagining story sequence in movie format from the perspective of the auidence)—being simultaneously managed.

This example shows details of the characteristics of digital play that have not yet been discussed in the literature and adds to the work of Björk-Willén and Aronsson (2014). Consistent with previous work indicating that young children's nondigital social pretend play is an activity of negotiations (e.g., Göncü, 1993), the present analyses on digital play also indicates that digital play requires negotiations and construction of intersubjectivity among the players. The digital play described here required negotiations between children in order that children together successfully take a sequence of photographs to digitally reproduce accurately the story line of the *Three Billy Goats Gruff*.

The relations between motives and demands

The motive a teacher has for the particular activities she or he creates may be different from the motive the children have for entering into that particular activity, and this difference can create unexpected new demands upon children, requiring negotiations about the purpose of the activity. In this section, we look at this problem from the perspective of children and the perspective of the teacher. This is illustrated through an example of two children who are in the same activity, but who have a different motive orientation—one of the children had the same motive intended by the teacher, and the other child did not. This is followed by examples of two teachers who each introduced slowmation to their children and who had to enter into negotiations with the children about the purpose of the activity, because the motive orientations between the teacher and the children were different.

Perspective of the children

To better understand the relations among children during digital play, the study needed to draw upon Vygotsky's concept of the social situation of development. This concept enables us to understand the relations between the institutional motive for supporting digital play by learning how to make a slowmation and children's personal motive for play or for learning (as well as understanding conflicting motives of children). In line with previous research (Fleer, 2014a), the analysis of the data also led to the finding that using the digital tools was demanding only if children were interested in making a slowmation.

For example, in the observation that follows, two children of the same age (3;9 years), Ginger and Owen, are interacting with the figures from the fairy tale of Goldilocks and the Three Bears.

> Ginger's motive orientation to learning: Ginger places the objects into the scene so she can take a photograph. She spends some time orienting the object in the scene by moving it back and forth in relation to the iPad camera lens. Just as she is about to take the photograph, Owen picks up the stirring device.
>
> Owen's motive orientation to play: Owen places the stirring device into the bowl and begins to make porridge, commenting about the need to stir the porridge. One of the other children takes Goldilocks and flies her around the scene. Owen adds porridge, stirs again, and then takes Goldilocks and dresses her. Ginger then tries to reposition the objects in order to take a photograph (MM. 058).

We see that Ginger has a motive orientation to learn how to create an animation of the story of *Goldilocks and the Three Bears* using an iPad and figures, whereas Owen has a motive orientation toward play. Two children who are in exactly the same situation experience it completely differently because of their motive orientation to either play or learn. Both children, therefore, have a different

social situation of development, and this helps explain in a more nuanced way the demands of the digitally supported play. For Ginger the digital technology placed a great deal of demand upon her because she was interested in making a movie of *Goldilocks and the Three Bears*. The demands upon her were conceptual (e.g., being able to position the objects within the view of the camera), technological (swiping action to flick through photographs), and social (e.g., being able to collaboratively make a movie). Interesting to note, whereas Owen was physically present, his focus of attention was on play and not on learning how to make a slowmation as expected by the teachers.

Perspective of the teacher

In the following example of the same centre that Ginger and Owen attended, the teacher's intentions are followed. It is the first time the teacher has introduced the process of making a slowmation to the children. The teacher is seated on a chair with her arms around Hugh (4;0 years) and a tripod with a camera on it. The camera is positioned so that it captures the projected shadow puppet images for the fairy tale of *Goldilocks and the Three Bears*. Hugh cannot move because he is enveloped in the teacher's arms, and his finger is supported by the teacher, poised to press the camera button. Three other children, Angela (3;7 years), Elizabeth (3;7 years), and Ginger are standing around the overhead projector and are moving puppets about. The children move the figures around as the teacher tells the story, and at key points in the story she presses Hugh's finger onto the camera button while she asks him to take a photograph. The example that follows is from the scene of Goldilocks going up stairs to go into the Bear's bed.

> The teacher says, "Angela and Hugh … now we have lost Angela, Angela, do you want to come back and help, darling?" Angela walks off and does not respond. The teacher tries to encourage her back by saying, "Elizabeth wants your help." There is no response from Angela. Elizabeth also walks away. The teacher looks to the research assistant and says, "It doesn't take much." She then directs her attention to Elizabeth, who is close by, but looking toward the teacher. "Elizabeth, Hugh will take the photos for you darling. … Just come and finish the story." Elizabeth returns, but does not pick up any of the puppets. The teacher says, "Which bed is Goldilocks in? Just show me which bed." Ginger now says, "Time to wake up. Time to wake up. Time to wake up," predicting what is to happen. Elizabeth moves Goldilocks as the teacher says, "We just need the bears to find Goldilocks in bed and then you're finished. … Just make the bears frighten Goldilocks to make her run away." The teacher looks to the research assistant again and says, "Oh there is just too much interference wise." Elizabeth walks away, as the teacher says "Is that the end, Elizabeth?" She turns back and smiles and nods and then continues to walk away (MM 12 42).

This is an early period in the data gathering, and the children are learning about making a slowmation. It is difficult to identify Hugh's motive orientation from the data. However, it is clear that Elizabeth does not wish to participate—either to role-play the story or make a slowmation. The teacher's motive is different from that of Elizabeth's as she tries to draw Elizabeth into the role-play through the characters in the fairy tale when she says, "We just need the bears to find Goldilocks in bed and then you're finished." There are demands on Elizabeth to participate, but there are also demands upon the teacher, who wishes to teach the children how to make the slowmation. The teacher's agenda is about learning, whereas Elizabeth's agenda is to play elsewhere. This is supported by the teacher's comments to the research assistant, when she initially says, "It doesn't take much," and later says, "Oh there is just too much interference wise." Elizabeth's response of walking away and smiling when the teacher says, "Is that the end, Elizabeth?" would support the contradiction between the child's motive for play and the teacher's motive for learning. This contradiction in motives has not yet been explicitly noted in the literature. Closest to this is Hedegaard (2002), who has argued that teachers need to create the conditions that make particular learning experiences motivating. An orienting motive in educational settings may fill the developmental gap between a teacher's and children's motives in preschool settings.

The study also found evidence that slowmation put demands upon the teacher to socially negotiate with children. In the free play setting, the different motive orientations of children (to learn slowmation or to play with the camera button) required the teacher to negotiate on behalf of

the children who wished to purposefully use, rather than play with, the technology or the Three Billy Goat objects. A typical example follows:

> The teacher is supporting Steven (5;2 years) to create a slowmation of the fairy tale *Three Billy Goats Gruff*. Vivian (5;0 years) is actively observing. The teacher invites Steven to incrementally move the goats and to use the iPad to take a photo of each movement so that the result will show the goats gradually moving over the bridge. However, in the process of doing this, other children continually enter into the set that they are trying to photograph, and the teacher has to ask them to move away. The teacher moves closer to Steven, who is standing at the set, and supports his efforts. Vivian moves over and watches closely. Jason (5;7 years) moves from another part of the preschool and tries to press the camera button on the iPad. The teacher notices and says, holding her palm up as a firm but friendly gesture, "Jason, don't touch it. No, no, no, no," and then waves her hand saying, "The goat is not ready yet." Prashard (4;8 years) joins the group and goes to press the camera button on the iPad while Steven is standing in front of the set adjusting the goat. The teacher notices and says to Prashard, "Wait. Wait. Just wait. Prashard, you need to wait. This is Steven's job." Once Steven has moved out of the shot, the teacher says, "OK you need to take the photo" (RD 12 14 58:00).

Negotiating the purpose of the task with Steven was not difficult, but it was in relation to Prashard and Jason, as the final comment suggests: "Prashard, you need to wait. This is Steven's job." In this example, there appears to be an alignment in motive orientation between the teacher and Steven (and possibly Vivian), but not with Prashard or Jason. Alignment was also shown in the earlier example of Timothy and Annabelle, but not for Owen and Ginger. Negotiation between individuals appears to be related to their motive orientation. However, as Hedegaard (2002) has argued, the purpose of the activities in many educational settings appears to be hidden from the child. Through the teacher making explicit what was required, and through coordinating the social interactions in this free play setting, the possibilities for the different motive orientations of the children became visible. By seeing the activity setting as a learning experience of making a slowmation, the motive orientation for learning, rather than play was foregrounded. The play motive of Prashard and Jason was put on hold by having to wait, but this gave a space to see how the materials in the activity setting could be differently used—not as play things, but for making or learning to make, a slowmation. These moments in free play settings are important for collectively and over time developing a motive orientation to learning. Hedegaard (2002) has argued that different motives can be associated with different activity settings, as well as different moments within the same activity setting: "The multiple motivation of activities can be understood in many ways, in that different people can participate in the same activity with different motives, and one person can have several motives for participating" (p. 62). As this study has shown, the teachers' motives can be very different than the children's motives, and similarly the motive orientation of all the children in a preschool setting are undoubtedly different. This disparity in motives is theoretically an unrecognized demand between children and between children and their teacher. This disparity is particularly pronounced in free play settings because children have more degrees of freedom (van Oers, 2013) to decide upon what they would like to participate in and to do.

In summary, it was found that the children negotiated with one another about the purpose of the activity—to role-play with the objects or to use these for making a slowmation (i.e., Owen and Ginger). We also found that the teacher had to negotiate with the children about the nature of the activity (i.e., Elizabeth)—as well as the purpose of the activity—to play with the camera button on the iPad (i.e., Prashard) or the fairy-tale objects set up in the scene (i.e., Jason), or to use these for making a slowmation (i.e., Steven). The relations between motives and demands as discussed here indicate the complexity about how children enter into negotiations with one another when slowmation is introduced and how the teacher must also negotiate with children about the purpose of the activity, because contradictions exist between the motives of children who wish to free play and a teacher who wishes the children to engage in a structured activity of learning.

Conclusion

The present study sought to examine how preschools change the conditions for play when a digital device (iPad) and digital program (slowmation) are introduced during free play time. Two major findings emerged from this study: The first relates to the psychological dimensions of digital play, and the second relates to the contradiction in motive orientation among the participants with different social situations of development, and negotiations of motives when a digital tool is introduced into free play time in preschools. These are discussed in turn.

Psychological dimensions of digital play

Digital and photographic recording of children's role-play was a new cultural practice for the children in this study. Like social pretend play, a high level of intersubjectivity appeared to be necessary for the digital role-play to be successful. However, in order to produce a slowmation successfully the children seemed to need to conceptualise the new practice through both socially orchestrating and technically coordinating their actions, which was found to be different from social pretend play. Different from previous research (e.g., Fleer & Hoban, 2012; Marsh et al., 2016; Verenikina & Kervin, 2011), the children appeared to think about the overall narrative of the fairy tale while considering the scene they were creating from the perspective of the audience, who would later be viewing their animation of the fairy tale (as witnessed in the examples of Annabelle and Kerryn). A doubleness of thinking by the children appeared to be needed. It can be speculated that the slowmation seemed to generate the need for the children to be both inside the narrative and outside the narrative as the audience. This psychological dimension of digital role-play has not been discussed in the literature and emerges as a new area of further inquiry in future research.

Further, a digital narrative created during role-play appeared to act as a digital placeholder for the children, and the digital device and digital tool (slowmation) appeared to act as a virtual pivot for supporting the children to successfully produce the fairy tale as a slowmation. This not only affirms earlier research (Fleer, 2014b), but also adds to this work by showing how the digital representation on the digital device serves the role of acting as a new representation of the play object (e.g., digital, rather than the plastic figures of the *Three Billy Goats Gruff*) and action (e.g., goats crossing the bridge in digital format). This is different from existing play research (e.g., Göncü et al., 2007; van Oers, 2013) and digital play (e.g., Marsh et al., 2016; Moore, 2014; Verenikina & Kervin, 2011). This finding adds to the limited literature on digital play and contributes to understanding how slowmation when used by children can support their play in virtual contexts.

Negotiating the contradictions

The research also found that for some, the children's personal motive for role-playing the fairy tale using the props was intermeshed with their personal motive for learning how to make the slowmation, whereas for some others it was not. As might be expected, there will always be a mix of children with motive orientations to play and to learning in preschools. However, the way that the leading activity for one or the other has a bearing on how the learning experiences introduced by teachers were negotiated is new here. A child's motive orientation appears to determine what might be possible to learn. When children's motive orientations matched, as was shown in the examples of Timothy and Annabelle, who both appeared to have a motive orientation to learning, there was not much need for negotiation of the activity. However, when children's motive orientations differed, as was the case in the example of Ginger and Owen, achieving intersubjectivity and realizing the institutional goals set by the teacher became problematic.

The study also showed that many opportunities for making a slowmation were available to the children, and the activity of creating a slowmation was found to be engaging with a diversity of participation in the slowmation activity. This practice might be theoretically supportive of the view

that "learning within the zone of proximal development takes place when the learning orients the child to a new practice" (Hedegaard & Fleer, 2013, p. 210). To speculate further, this might mean that a child's activity must always be in relation to the child's motive orientation, but for development to take place it must also reach forward into the following period of development (see Chaiklin, 2003) where the maturing functions are in the process of development (Vygotsky, 1998). This theoretically explains the zone of proximal development for those children whose motive orientation is for play, but who over time become oriented to learning to make a slowmation in the digital play context created by the teacher. However, longitudinal research would need to undertaken to support this theoretical proposition.

The study also revealed a contradiction between a teacher's goal for teaching and children's motive for play, where teachers had to negotiate with children the purpose of the activity. Hedegaard and Fleer (2013) suggested that children learn about how to deal with the contradictions between their own wishes and motives and those of the teachers. Children must find new ways of engaging in the new demands being introduced. In examining the literature, we can say that we know very little about how adults and children negotiate their personal goals, and we know even less about why children want to learn adult directed content through play. This is a central problem across many countries (e.g., Hakkarainen, Bredikyte, Jakkula, & Munter, 2013; Hedges, 2014; Pramling Samuelsson & Pramling, 2014; Ryan & Northey-Berg, 2014; Wood, 2014) where increased investments in early education have raised questions about the nature of the outcomes for learning in play-based settings. Therefore studying how children and teachers negotiate the purpose of an activity potentially adds to this literature by showing the significance of a child and a teacher's motive orientation.

In line with long-standing studies on the role of negotiations during play, and the importance of building intersubjectivity between players (Göncü, 1993), the findings of this study suggest that digital play can create motivating conditions for play and learning. However, teachers must pay attention to children's personal motive orientation and not underestimate their role in negotiating with children the purpose of the educational goals. Digital play through the new demands identified in this study suggests opportunities for children's development that were not theorised in Vygotsky's time, and as such the findings of this study make a small but contemporary contribution to his original conception of play.

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