The Digital Divide

The internet and social inequality in international perspective

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2 A theory of the digital divide[1]

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A relational view of inequality

Contemporary research of the digital divide and digital skills is marked by a descriptive nature (van Dijk, 2006a). Inequalities are described using simple demographics of individuals who have more or less access to computers and the Internet and a different level of digital skills. The explanation of these differences has received far less attention. One of the reasons for this state of affairs is the predominance of individualistic notions of inequality. Like most social, scientific and economic investigations, digital divide research works based on so-called methodological individualism (Wellman and Berkowitz, 1988). Differential access to information and computer technologies (ICTs) is related to individuals and their characteristics: level of income and education, employment, age, sex, and ethnicity, to mention the most important ones. This is the usual approach in survey research, which measures the properties and attitudes of individual respondents. Making multivariate analyses of several individual properties and aggregating them to produce properties of collectivities, one hopes to find background explanations.

This kind of research might produce useful data, but it does not automatically result in explanations, as it is not guided by theory or by hypotheses derived from theory. They remain on a descriptive level of reasoning. One is not able to explain, for example, what it is about age and gender that produces the differences observed. Another disadvantage of the individualistic approach to inequality is the social and political effect of simply blaming inequality of access on attributes of individuals such as a lack of motivation or the urge to spend money on things other than digital technology and the correction of inadequate digital skills.

An alternative notion of inequality uses a relational or network approach (Wellman and Berkowitz, 1988). Here the prime units of analysis are not individuals but the positions of individuals and the relationships between them. Inequality is not primarily a matter of individual attributes but of categorical differences between groups of people. This is the point of

departure of the groundbreaking work *Durable Inequality* by the American sociologist Charles Tilly (1999). "The central argument runs like this: Large, significant inequalities in advantages among human beings correspond mainly to categorical differences such as black/white, male/female, citizen/foreigner, or Muslim/Jew rather than to individual differences in attributes, propensities, or performances" (p. 7). The point of departure of this notion of inequality is that neither the essences of individuals nor the essences of particular collectives or systems (e.g., capitalism, patriarchy) but rather the bonds, relationships, interactions, and transactions between people. "I claim that an account of how transactions clump into social ties, social ties concatenate into networks, and existing networks constrain solutions of organizational problems clarifies the creation, maintenance and change of categorical inequality" (p. 21).

On the issues of the digital divide and digital skills the most important categorical distinctions are employers and (un)employed, management and employees, people with high and low levels of education, males and females, the old and the young, parents and children, whites and blacks, citizens and migrants. At the macro level of countries, we can observe the categorical inequality of developed and developing countries, sometimes indicated as countries from the North and countries from the South of the globe. In every case, the first of these pairs is the dominant category in almost every part of the world, the white-black distinction excluded. With two exceptions (the aged and parents), this also goes for digital access and skills, as we will see in the remainder of this chapter.

A first instance of the insight offered by the relational view is an explanation of the differential appropriation of technology. Access to new technological means is a part of this. The dominant category is the first to adopt the new technology. It uses this advantage to increase power in its relationship with the subordinate category. I will give a preliminary example of the type of explanation the relational view is able to produce here. Gender differences in the appropriation of technology start very early in life. Little boys are the first to pick up technical toys and devices, passing the little girls, most often their sisters and small female neighbors or friends. These girls leave the operation to the boys, perhaps at first because the girls are less secure in handling them. Here a long process of continual reinforcement starts in which the girls "never" learn to operate the devices and the boys improve. This progresses into adulthood, where males are able to appropriate the great majority of technical and strategically important jobs and, in practice, keep females out of these jobs, whether they are conscious of this fact or not. This kind of explanation will unearth more of the actual mechanisms creating inequality than will an explanation in terms of individual attributes (females being less technical or less motivated, etc.).

A second advantage of the relational view of inequality is the capacity to make better distinctions between types of inequality. Individualistic

notions of inequality produce an endless number of differences that can be observed between individuals, with no particular priority among them. Instead, distinctions have to be made between types of difference and attention has to be called to the structural aspects of society who refer to the relatively permanent and systemic nature of the differentiation called inequality. In Tilly's definition, inequality is the unequal distribution of resources in society as a result of the competition of categorical pairs, which produces systems of social closure, exploitation, and control (Tilly, 1999, pp. 7–9). Although this competition and the resulting distributions are changing continually, the categorical pairs reproduce themselves through mechanisms of social closure, exploitation, and control. In this way, inequality becomes a systematic or structural characteristic of societies. Using Tilly's terminology, it is "durable" as soon as it depends heavily on the institutionalization of categorical pairs in social, economic and cultural systems such as capitalism, bureaucracy and patriarchy (p. 8).

A third advantage of the relational view is that it is not necessary to give priority to any of the pairs in advance. Their relative importance is a matter of empirical observation, producing different results for every society. Moreover, the pairs overlap with individuals. Take, for instance, a relatively poor, young, single, female, Jamaican teacher living in the United Kingdom. Her inclusion in the categories of educational workers, young people, and inhabitants of a developed country would put her on the "right" side of the digital divide, as we will observe in the next four chapters. However, being a female with relatively low income, perhaps living alone without a partner or children to share a computer or Internet connection, and being part of an ethnic minority means that she would most likely be on the "wrong" side of the divide. This example shows the complexity of this type of inequality. In this chapter we will argue that labor market position, educational position, age, and sex, or gender, are the most important categorical inequalities determining the present digital divide.

A final benefit of the relational view of equality is that it directs our attention to relative inequality between people and their positions and resources. All too often, the metaphor of the digital divide suggests a yawning gap and the absolute exclusion of certain people. Earlier, I claimed that the simple picture of a two-tiered information society might better be replaced by the image of a continuum or a spectrum of positions across the population that is stretched when inequality increases (van Dijk, 1999). The absolute exclusion of access to digital media remains important, even in the developed countries, but the emphasis is shifting to the relative differences between people who already have access in a certain way or to a particular extent. These differences are relative inequalities of skills and usage. They are becoming even more important in the information society and the network society. In my opinion, individualistic notions of inequality are inadequate if one is to understand

these relatively new kinds of inequality as they are increasingly linked to relationships, social networks and being first in the appropriation of information ("information is power").

Resources and appropriation theory

In my book, *The Deepening Divide* (van Dijk, 2005), I have developed a theory based upon this relational view of inequality. I call it a resources and appropriation theory of the diffusion, acceptance and adoption of new technologies. The following four are the core concepts of this theory:

1 a number of personal and positional categorical inequalities in society;
2 the distribution of resources relevant to this type of inequality;
3 a number of kinds of access to ICTs;
4 a number of fields of participation in society.

Items 1 and 2 are held to be the causes, and 3 is the phenomenon to be explained, together with 4, the potential consequence of the whole process. Being part of a process, 4 feeds back upon 1 and 2, as more or less participation in several fields of society will change the relationships of categorical inequalities and the distribution of resources in society. Finally, a fifth state of affairs determining the type of inequality to be explained has to be added as a side factor: the special characteristics of information and communication technology. In this way, a dynamic model can be drawn that forms the representation of this theory, as illustrated in Figure 2.1.

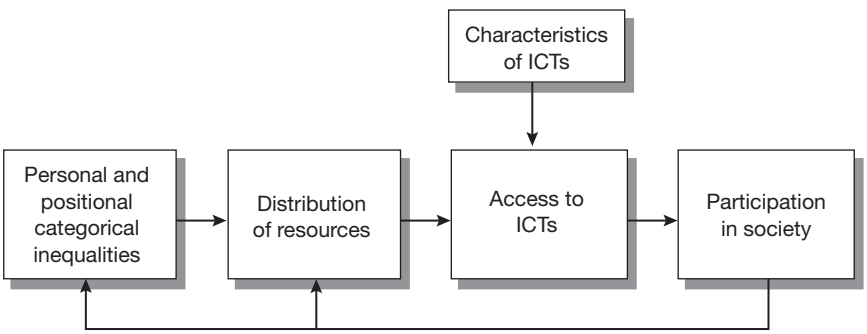

Figure 2.1 A causal model of resources and appropriation theory

The core argument can be summarized in the following statements:

1 Categorical inequalities in society produce an unequal distribution of resources.
2 An unequal distribution of resources causes unequal access to digital technologies.
3 Unequal access to digital technologies also depends on the characteristics of these technologies.
4 Unequal access to digital technologies brings about unequal participation in society.
5 Unequal participation in society reinforces categorical inequalities and unequal distributions of resources.

The following *personal categorical inequalities* can be frequently observed in digital divide research:

- age (young/old)
- gender (male/female)
- race/ethnicity (majority/minority)
- intelligence (high/low)
- personality (extravert/introvert; self-confident/not self-confident)
- health (abled/disabled).

The same goes for the following *positional categorical inequalities*:

- labor position (entrepreneurs/workers; management/employees; employed/unemployed)
- education (high/low)
- household (family/single person)
- nation (developed/developing).

In most empirical observations, the first of these relational categories has more access than does the second.

The following *resources* frequently figure in digital divide research, sometimes under other labels such as economic, social, and cultural capital:

- temporal (having time to use digital media)
- material (possession and income)
- mental (technical ability; motivation)
- social (having a social network to assist in using digital media)
- cultural (status and preference for being in the world of digital media).

The core part of the model is a number of *kinds of access* in succession. Here the multi-faced concept of access is refined and conceived as the

total process of appropriation of a new technology. This is partly responsible for the theory's name of Resources and Appropriation Theory. To appropriate a new technology one should first be motivated to use it. When sufficient motivation is developed one should be able to acquire physical access to a computer, the Internet or another digital medium. Additionally, one needs the material resources to keep using the technology that consists of peripheral equipment, software, ink, paper, subscriptions and so on. Having physical and material access does not automatically lead to appropriation of the technology as one first has to develop several skills to use the medium concerned. The more these skills are developed the more appropriate use can be made of the technology in several applications. The concept of usage can be measured, among others by the observation of the frequency of usage and the number and diversity of applications. This process is depicted in Figure 2.2, which is the framework for the relative long exposition of the following section.

The *characteristics of ICT* as a technology are sideward factors in Figure 2.1. When a technology is experienced to be complex, expensive, multi-faced (multimedia) and leading to problems of accessibility and usability this will increase access problems in general. Computer devices simply are not equal to, for example, television sets. In the first decades of the existence of ICT the characteristics mentioned were widespread in the supply of this technology. In the most recent decade considerable progress has been made in making the hardware and software concerned more accessible and usable for larger parts of the population. Understandably, this has reduced the gaps of digital skills and usage.

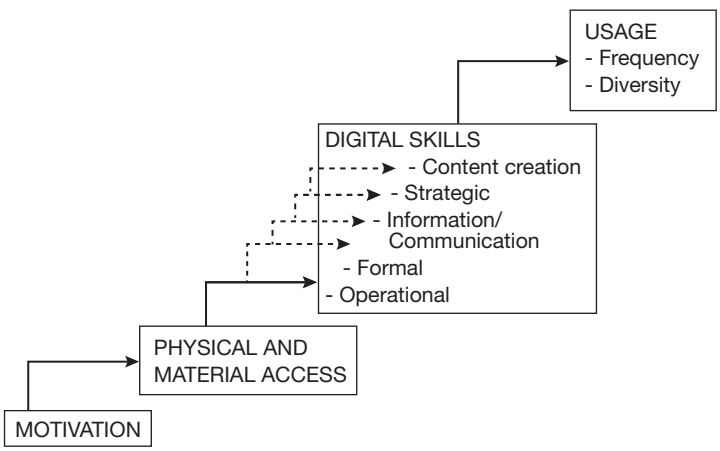

Figure 2.2 Four successive kinds of access in the appropriation of digital technology

The final factor in Figure 2.1 is the stake of the digital divide. The consequences of unequal access of all kinds are more or less participation in several fields of society: economic (such as jobs), social (e.g. social contacts), political (voting and other kinds of political participation), cultural (participating in cyber-culture), spatial (being able to lead a mobile life) and institutional (such as realizing citizenship rights).

The following section presents the main results to date of empirical research following the four kinds of access distinguished. Most results presented are from the Netherlands where the author of this chapter was able to test his theory in a large number of surveys and skill performance tests. Most likely the state of affairs in Germany will be not much different from the Netherlands. The only two differences between the countries are that the Netherlands has a bit higher Internet access rate than Germany (91 percent of Internet household access as compared to 82 percent in 2010, according to Eurostat) and a larger proportion of users with a low educational background. The popularization of the Internet has advanced a bit more in the Netherlands than in Germany.

Research on motivation, physical access, skills and usage

Motivation

Prior to physical access comes the wish to have a computer and to be connected to the Internet. Many of those who remain at the "wrong" side of the digital divide have motivational problems. It appears that there are not only "have nots," but also "want nots" considering digital technology. With the advent of a new technology, acceptance problems in terms of motivation always are highest. In the 1980s and 1990s many people gave answers in survey questions that they did not need a computer or Internet connection. When the technology has largely diffused in society the motivation to obtain a computer and reach Internet access increases fast. In countries with a high diffusion of ICTs even people that are far above age 80 are motivated to get access, if only to communicate with their grandchildren. In the year 2011 it was observed that 95 percent of the Dutch population was motivated to have access to the Internet (van Deursen and van Dijk, 2011). In the age of Internet hype and afterwards when diffusion rose fast, research for the motivation to have access has been relatively ignored. At the turn of the century German and American surveys (ARD/ZDF, 1999a; NTIA, 2000) showed that the main reasons for the refusal were:

- no need or significant usage opportunities;
- no time or desire;
- rejection of the medium (the Internet and computer games as "dangerous" media);

- lack of money;
- lack of skills.

In several European and American surveys reported between 1999 and 2003 it was revealed that half of the unconnected to the Internet at that time explicitly responded that they would refuse to get connected, for the list of reasons just mentioned (e.g., ARD/ZDF, 1999b) and a Pew Internet and American Life survey (Lenhart *et al.*, 2003).

These observations lead us to one of the most confusing myths produced by popular ideas about the digital divide: that people are either in or out, included or excluded. The last referenced survey revealed that the Internet population in fact is ever shifting (Lenhart *et al.*, 2003). First, there are so-called intermittent users: people who go offline for extended periods for some reason. A second often unnoticed group is the drop-outs that more or less permanently lost connection to the Internet. Their number was 10 percent of the American population in 2002 (Lenhart *et al.*, 2003). The next group is the "net-evaders" that simply refuse to use the Internet and it does not matter whether they have the resources or not (among them older managers charging their secretaries to use e-mail and search the Internet and persons being proud of not using that "filthy medium" or operating computers as that is deemed to be "women's work" by some macho-male workers). However, the number of intermittent users, drop-outs and net-evaders is decreasing as the technology becomes a necessary tool for daily life. In the year 2011 the proportion of drop-outs in the Dutch population fell to 9 percent among a total of complete non-users also comprising 9 percent. The most important reasons for complete non-use and for drop-out from earlier use are lack of interest (47 percent), feeling too old to use it (26 percent), not needing it (22 percent), and having insufficient skills to use it (15 percent) (van Deursen and van Dijk, 2011). However, the most important result of this 2011 survey was that only 7.3 percent of non-users in the Netherlands were prepared to potentially use the Internet in the future. So, in this country the hard core of refusing non-users has already been reached.

The ever-shifting Internet population focuses our attention on a second, perhaps even more important myth produced by the misleading dichotomy of the digital divide. This is the assumption that those who have a computer or Internet connection are actually using it. Many presumed users use the computer or the Internet only once a week or a couple of times a month, a few people even never use them. Measuring computer and Internet access in survey questions often conflates possession or connection with use or usage time. Time diary studies and the like show much larger differences or divides between categories of people as will be argued in the subsection on usage below.

The factors explaining motivational access are both of a social or cultural and a mental or psychological nature. A primary social

explanation is that "the Internet does not have appeal for low-income and low-educated people" (Katz and Rice, 2002, p. 93). To dig deeper into the reasons for this lack of interest it seems appropriate to complete the large-scale surveys with qualitative studies in local communities and cultural groups. This was done for instance by Laura Stanley in a San Diego study in poor Latino and African American working class neighborhoods (Stanley, 2001) and by the University of Texas in poor communities of Austin (Rojas *et al.*, 2004). They discovered the importance of traditional masculine cultures (rejecting computer work that is not "cool" and "something girls do") and of particular minority and working class lifestyles.

However, most pronounced are mental and psychological explanations. Here the phenomena of computer anxiety and technophobia come forwards. Computer anxiety is a feeling of discomfort, stress, or fear experienced when confronting computers (Brosnan, 1998; Chua, Chen and Wong, 1999; Rockwell and Singleton, 2002). Technophobia is a fear of technology in general and distrust in its beneficial effects. According to a representative UCLA survey of 2003, more than 30 percent of new American Internet users reported that they were moderately to highly technophobic and the same applied to 10 percent of experienced Internet users (UCLA, 2003, p. 25). Computer anxiety and technophobia are still major barriers to computer and Internet access in many countries, especially among seniors, people with a low educational level and a part of the female population. These phenomena are decreasing, but do not completely disappear with a further diffusion of computers and Internet access in society.

The continuation of anxiety is partly explained by personality characteristics. The Big Five personality dimensions (agreeableness, conscientiousness, neuroticism, extraversion, and openness) are known to be related to computer use, attitude and stress (Hudiburg, 1999). For example, neuroticism aggravates problems experienced in approaching and using computers and extraversion alleviates them. See Hudiburg (1999) and Finn and Korukonda (2004) for the personality dimensions related to computer use.

Physical and material access

The overwhelming majority of digital divide investigations are dedicated to the observation of divides of physical access to personal computers and the Internet among demographical categories that are obvious in this respect: income, education, age, sex, and ethnicity. The first nation-wide surveys in the developed countries at the end of the 1990s and the turn of the century all showed growing gaps of access between people with high and low income or education and majority ethnicities as compared to minority ethnicities. However, the gender physical access divide has closed

in those years, complete closure for this gap only happened in the Northern American and North-Western European countries. Considering age, the relationship is curved: physical access peaks in the age group of 25 to 40 and sharply declines afterwards. Clearly, the youngest generation and women benefit from the household possession of computers, as households are the most familiar survey unit of measurement. From the years 2000–2002 onwards the physical access divides in the northern European, American and Eastern-Asian developed countries started to decline as the categories with high income and education reached partial saturation and people with lower income and education started to catch up (NTIA, 2002; Horrigan and Rainie, 2002; Eurobarometer 56–63, 2001–2010). However, in the developing countries the physical access divide kept widening and is still widening (United Nations Statistics Division, 2004; van Dijk, 2005).

Probably, the path of the physical access divide follows the familiar S-curve of the adoption of innovations. However, the path is much more complex and differentiated among groups of the population than the S-curve projects and there are serious problems with mainstream diffusion theory considering computer and Internet technology (see van Dijk, 2005, p. 62–65). One of these problems is treated by Norris (2001) who makes a distinction between normalization and stratification models of diffusion. In the normalization model it is presupposed that the differences between groups only increase in the early stages of adoption and that differences disappear with saturation in the last stages. In the stratification model it is assumed that first, there is a different point of departure of the access curve for the higher and the lower social strata and second, a different point of arrival: for some strata it might never reach 90 to 100 percent.

The two models lead to quite different projections of the evolution of the digital divide. (See Figure 2.2 above.) This figure compares the curve of adoption of the highest and lowest social strata in terms of physical access. In all countries, there is higher access for people with high education and income and a low age and there is lower access for people with low education and income and a high age. It shows how they come together after reaching a particular tipping point and in this way gradually close the physical access divide. The model projects (almost) complete future closure when a normalization model applies and the continuation of a (smaller) gap when the stratification model applies. In the Netherlands and other rich countries it seems that the normalization model applies (van Deursen and van Dijk, 2011); in poorer countries the stratification model gives a better reflection of the current and the probable coming situation. The developed countries on average crossed the tipping point between the years of 2000 and 2005. The developing countries have not yet reached this state (see the annual ITU (International Telecommunications Union) figures of the diffusion of PCs and Internet connections across countries with different level of development [United Nations Statistics

Division, 2004]). A tipping point is a concept of network theory. It refers to a sudden acceleration or slow-down in the diffusion of an innovation. Concerning the digital divide two tipping points appear. The first is the acceleration that happens when sufficient other people are connected to a network; then it makes more sense to also connect. This occurs at around 20 to 25 percent of diffusion. The higher social strata and the young are the first to experience this drive to connect. In this way the divide broadens. The second tipping point happens when a majority is connected and saturation sets in, usually at around a two-thirds access rate. On this occasion the lower social strata and the seniors are starting to catch up and the divide narrows. It is this second point that we are talking about here and that is indicated in Figure 2.3.

The background variables mentioned reveal that material and social types of inequality are prevalent in digital divide research explaining differences of physical access. The concepts of economic, social, and cultural capital are the most popular ones. Others defend a resource based approach (van Dijk *et al.*. 2000; de Haan, 2003; Dutta-Bergman, 2005). The author of this chapter combines a resource based and a network approach that focuses on social positions (van Dijk, 2005). According to this theory, differences of physical access are related to a distribution of resources (temporal, mental, material, social and cultural) that in turn is explained by personal categories such as age, sex, intelligence, personality and ability and positions in society (of labor, education and household position).

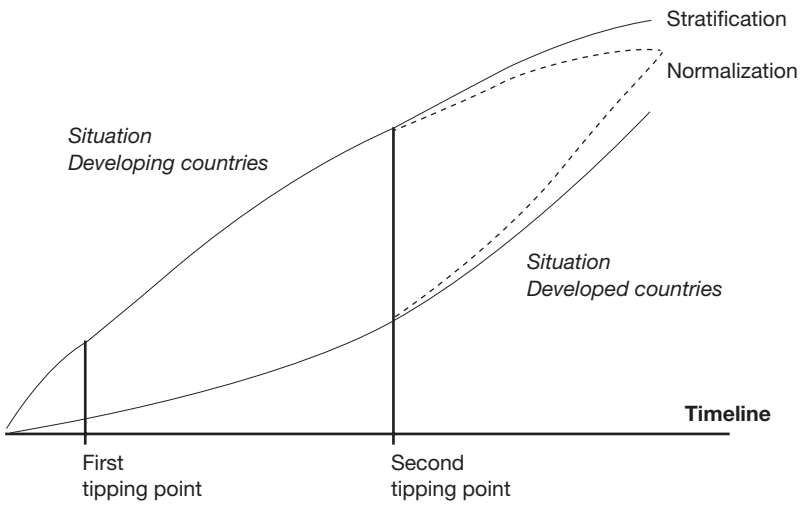

Figure 2.3 Evolution of the digital divide of physical access in time (line below: access of categories of low education, low income and higher age; line above: access of categories of high education, high income and lower age)

Unfortunately digital divide research with a focus on physical access is rather descriptive and does not relate to such theories. The most common exception is the S-curve of adoption derived from diffusion of innovations theory and partly reflected in Figure 2.3.

Next to physical access the broader concept of *material access* can be distinguished. This applies when not only the core hardware of a computer, smart phone or Internet connection is considered but also peripheral equipment, materials such as paper and ink, software and not forgetting subscriptions. They comprise a growing part of the total expenses for digital media. While hardware costs for single devices tend to decline, the number of devices purchased these days tends to rise. Evidently, sufficient income remains an important condition here. So, when the physical access gap is closing, income inequalities remain important for material access at large.

Digital skills

After having acquired the motivation to use computers and some kind of physical access to them, one has to learn to manage the hardware and software. Here the problem of a lack of skills might appear, according to the model in Figure 2.2. This problem is framed with terms such as "computer, information or multimedia literacy" and "computer skills" or "information capita." Steyaert (2000) and van Dijk (1999 2003, 2005) introduced the concept of "digital skills" as a succession of several types of skill. The most basic are "instrumental skills" (as per Steyaert) or "operational skills" (as per van Dijk), the capacities to work with hardware and software. These skills have acquired much attention in the literature and in public opinion.

The most popular view is that skills problems are solved when these skills are mastered. However, many scholars engaged with information processing in an information society have called attention to all kinds of content-related skills required to successfully use computers and the Internet. Steyaert distinguishes between "structural skills" and "strategic skills." Van Dijk (2005) proposed a comparable distinction between "information skills" and "strategic skills." Information skills are the skills to search, select, and process information in computer and network sources. They can be defined as the capacities to use computer and network sources as the means for particular goals and for the general goal of improving one's position in society.

In the last four years the author of this chapter and his Ph.D. student Alexander van Deursen have considerably refined the concept of digital/Internet skills into six types of digital/Internet skills and several kinds of measurement ranging from large-scale surveys to performance tests of Internet tasks in a media laboratory (van Deursen and van Dijk, 2010). The following medium-related and content-related Internet skills have been

distinguished and (already) partly measured, as in Figure 2.4. The focus of Internet skills can easily be enlarged to encompass other digital media.

Very little scientific research has been done on the actual level of digital skills possessed by people. Unfortunately it is extremely difficult to determine the actual level because most digital skills are not the result of computer courses, but of learning through practice in particular social user environments (van Dijk, 2005). So far, there are only few estimates of skills. A number of large-scale surveys have revealed dramatic differences of skills among populations, also among populations of countries with large new media diffusion (van Dijk, 2005; Warschauer, 2003). However, these surveys measure the actual level of digital skills possessed only by questions asking respondents to estimate their own level of digital skills. This kind of measurement has obvious problems of validity (Hargittai, 2002; Merritt, Smith and Renzo, 2005; Talja, 2005).

Measurements of real performances only occur in small educational settings or as a part of computer classes. The problem of these measurements is that they are fully normative: whether the goal of a particular course has been reached. A problem for both types of measurements, surveys and course exams is that they mostly use a limited definition of digital skills that does not go beyond the operational skills listed in Figure 2.4. There is virtually no attention to the "higher" content-related skills mentioned in this figure.

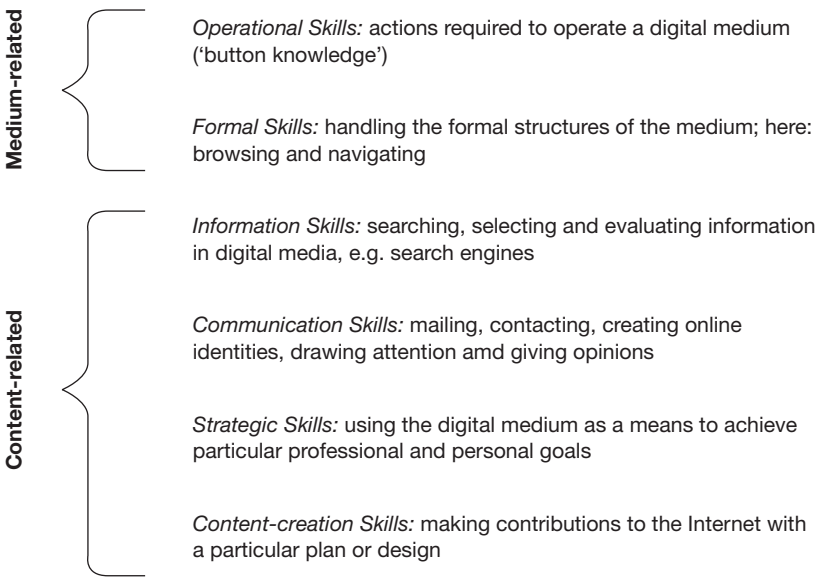

Figure 2.4 Six types of digital skills applied to Internet skills

The only way to obtain a valid and complete measurement of digital skills is to charge people with performance tests of computer and Internet tasks that they regularly meet in daily life. Performance tests have so far only been done by Hargittai (2002). She charged 54 demographically diverse American experimental subjects with five rather different Internet search tasks that belong to the information skills (as in Figure 2.4). The results revealed enormous differences of accomplishment of these tasks and the time needed for them.

The labor-intensive performance tests of van Deursen and van Dijk in a university media lab where they invited a cross-section of the Dutch population (adding up to more than 300 people) to perform nine comprehensive Internet tasks during 1.5 hours, have provided a more valid picture of the actual skills possessed by people (van Deursen, 2010). So far, operational, formal, information and strategic Internet skills have been measured (van Deursen and van Dijk, 2010). At the time of writing the communication and content-related skills are being tested.

The main conclusion of these tests is that in these tasks Dutch citizens showed a fairly high-level of operational and formal skills. On average 80 percent of the operational skill assignments and 72 percent of the formal skill assignments were successfully completed. However, the levels of information skills and strategic Internet skills attained were much lower. Information skill assignments were completed on average by 62 percent and strategic skill assignments on average by only 25 percent of those subjected to these performance tests. Unfortunately, there are no standards of comparison since comparable performance tests in other countries are non-existent.

The second main conclusion was that there were significant differences of performance between people of different ages and education. The most important factor appeared to be educational background. People with higher education perform better on all skills than people with a lower educational background. Age primarily appears to be a significant contributor to medium-related skills. Younger people perform better on these skills than older people do. However, the results regarding content-related skills prove different. In fact, age positively contributes to the level of content-related skills, meaning that older people perform better in information and strategic skills than young people on the condition that they have an adequate level of medium-related skills. However, due to the lack of medium-related Internet skills, many seniors are seriously limited in their content-related skills. This observation puts the abilities of the so-called "digital generation" in another perspective than it is known in public opinion. It also shows that the skills inequality problem will not automatically disappear in the future and that substantial education of all kinds and life experience remain vital for digital skills too. In none of the series of performance tests done so far has any gender difference been observed, despite the

fact that in pre-test questionnaires males indicated that their skills were significantly better than those of females.

Usage

Evidently, the purpose of the total process of appropriation is usage, according to Figure 2.2. Having sufficient motivation, physical access and skills to apply digital media are necessary but not sufficient conditions of actual use. Usage has its own grounds or determinants. As a dependent factor it can be measured in at least four ways:

1 usage time and frequency;
2 number and diversity of usage applications;
3 broadband or narrowband use;
4 more or less active or creative use.

In the remainder of this chapter I will concentrate on the first two ways. Current computer and Internet use statistics are notoriously unreliable with their shifting and divergent operational definitions of use, most often made by market research bureaus. They only give some indication how much actual use differs from physical access. Clearly, actual use diverges far from potential use. In the U.S. more exact measures of daily, weekly or monthly Internet use are reported in the annual surveys of, for instance, the Pew Internet and American Life Project (www.pewinternet.org) and the UCLA Internet Reports (www.digitalcenter.org). In Europe the same is done by the annual Eurobarometer and Eurostat statistics. However, the most valid and reliable estimations of actual usage time are made in detailed daily time diary studies that are representative for a particular country. They sometimes produce striking results. For example the Dutch Social and Cultural Planning Agency found in a 2001 time diary study that the number of weekly hours of computer and Internet use of males at that time was double as compared to females (Steyaert and de Haan, 2001). Ten years later this gender gap of computer and Internet usage time has almost closed in the Netherlands (van Deursen and van Dijk, 2011). Anyway, this still means that when a physical access gap for a particular social category closes, this does not mean that the comparable usage gap also disappears. This goes for frequency and time of usage but also for usage applications and the other two factors mentioned above. For example, in all countries males and females still have different preferences for particular Internet applications. We will see that there is still a gender usage gap in terms of applications.

A usage factor that is likely to equalize first is usage time. In 2010, van Deursen and van Dijk observed for the first time in history that Dutch people with low education were using the Internet in their leisure time for more hours a day than people with high education, specifically 3.2 hours a

day against 2.6 hours. This turned the computer and Internet usage time of the social classes in terms of education completely upside down as compared to the situation in the 1980s and 1990s when usage was completely dominated by the high educated. This was seen as a sign of the growing popularization of the Internet. This medium is merging completely with daily life and everyday activities and has become an essential facility for the large majority of people in the developed countries.

With this observation in mind it becomes relevant to look at the number and diversity of usage applications. What are the people with lower and higher education doing on the Internet? It appeared that people with low education used a smaller number of applications but for a much longer period of time. Popular applications requiring a relative long usage time for people with low education were chatting, online gaming, receiving audio-visual programs, social networking and trading places for products (e.g. eBay). Chatting and online gaming were the only Internet applications that were used significantly more by people with low education than with high education in the Netherlands.

These observations are confirmations of the thesis of the appearance of a so-called *usage gap* in terms of computer and Internet use that was suggested by van Dijk (1999, 2003, 2005), Bonfadelli (2002), Park (2002), Cho *et al.*, (2003), Zillien and Hargittai (2009) and others. The basic statement is that some sections of the population will more frequently use the *serious applications* with the highest advantageous effects on capital and resources (work, career, study, societal participation etc.), while other sections will use the *entertainment applications* with no, or very little, advantageous effects on capital and resources. This statement was first applied to people with low and high education, by van Dijk, Bonfadelli and others, in this way framing an education usage gap. This thesis is clearly related to the knowledge gap thesis of the 1970s (Tichenor *et al.*, 1970) that stated that the high educated derived more knowledge from the mass media such as television and newspapers than the low educated. Only, the usage gap is much broader and potentially more effective in terms of social inequality than the knowledge gap because the usage gap concerns differential uses and activities in all spheres of daily life, not just the perception and cognition of mass media.

An education usage gap was confirmed in an Internet usage trend survey in the Netherlands (van Dijk and van Deursen, 2012). Of the 31 Internet applications investigated (15 applications labeled "serious," 6 labeled "entertainment," and 10 "neutral," being "general every-day life applications" such as e-mail and search engine use) people with low education used significantly more entertainment than serious applications and for the high educated it was the opposite. However, age and gender usage gaps were also observed and in the year 2010 they were stronger than the education usage gap (van Deursen and van Dijk, 2013). Young

people (ages 16–35) used significantly more social networking, uploading and downloading of music and video files, chatting, gaming and free surfing, but also more serious applications such as news services, discussion groups, job hunting and educational applications than people of medium and old age. None of the 31 Internet applications were used significantly more by people of medium and old age. A gender usage gap was revealed by a significant higher use of 18 of the total of 31 Internet applications by males. Females significantly more often used the applications of e-mail, social networking, online gaming and slightly more often used patient websites or self-help groups.

Surveying the growing number of usage application surveys in the world, the author of this chapter draws the conclusion that, increasingly, all familiar social and cultural differences in society are reflected in computer and Internet use. He expects that the age usage gap will be the first to become smaller, with a large number of Internet applications that previously were mainly used by young people, such as social networking, online gaming, chatting and downloading audiovisuals, spreading to other age groups.

Research of unequal access effects

Strangely enough, research of the social effects of all these inequalities of access is very scarce. Apparently, researchers take the advantages of access to computers and the Internet for granted. But actually what is the stake of these inequalities? Do people with no, or limited access of the four kinds distinguished experience real disadvantages? So far, an important argument has been that people still have the old channels at their disposal that also deliver the information and communication channels they need. For those who have no Internet, plenty of radio and television stations and newspapers are available. For those who have no access to e-commerce, the number of physical shops abounds. People who need new social contacts or a romantic encounter do not necessarily need a social-networking site or an online dating service. They still have the choice of innumerable physical meeting places. Those who want to make a reservation can still pick up the phone.

To investigate the real advantages and disadvantages of having or not having access of the four kinds portrayed above, the Internet use trend surveys of 2010 and 2011 in the Netherlands (van Deursen and van Dijk, 2010, 2011) proposed to the respondents a number of precise statements about the potential advantages of Internet use that actually are measurement items of the concept of participation in Figure 2.1. These statements and their support are in Table 2.1. This is measured via the level of support among the respondents for ten statements which indicated the advantages of Internet usage. Among the Dutch Internet users surveyed, the average respondent agreed with four of the ten statements,

as illustrated in Table 2.1. However, there are big inequalities between people of different ages, educational levels and kinds of occupation. (See Figure 2.5.) In the end this is the most important figure concerning the digital divide. Here it is shown that access to computers and the Internet really matters. That those without access have a clear disadvantage and that those who only have access to traditional channels of information and communication lag behind. With the growing diffusion of these digital media in society they will probably lag further and further behind to finally become excluded from large parts of society. This is why more or less participation is the legitimate final effect of unequal access in the model of Figure 2.1.

Table 2.1 Percentage of Internet users in the Netherlands giving positive answers to potential advantages of Internet use in 2011

Statement	*Percentage Affirming*
After an online application concerning a vacancy I have obtained a job	19
Via the Internet I was able to buy a product cheaper than in a shop	80
Via the Internet I was able to sell or exchange something I otherwise would have taken as a loss	63
Via the Internet I have discovered which political party I would like to vote for	37
Via the Internet I have come across an association I became a member of (such as a sports club, a cultural association, a trade union or a political organization)	22
Via the Internet I have acquired one or more friends that I have really met later	32
Via a dating site I have made an appointment with a potential partner	14
Via the Internet I have discovered which medical illness I had	27
Via the Internet I have booked an economical holiday trip	60
Via the Internet I have achieved a discount on a product	42

Source: van Deursen and van Dijk, 2011.

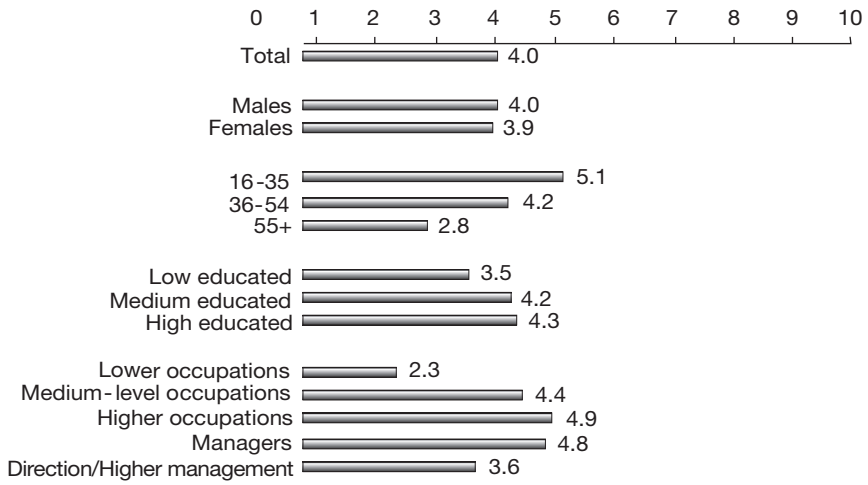

Figure 2.5 Average number of positive answers to 10 potential advantages of Internet use in the Netherlands in 2011. Source: van Deursen & van Dijk, 2011

Conclusion: Inequality in the network society

In the former section, we saw that unequal access to computers and the Internet has shifted from unequal motivation and physical access to inequalities of skills and usage. This observation is known in the literature as the so-called *Second Level Divide* (Hargittai, 2002; DiMaggio *et al.*, 2004) or the *Deepening Divide* (van Dijk, 2005). With the gradual close of the physical access divide, the digital divide problem as a whole is not solved. On the contrary, the problem gets deeper. Differences of skills and preferences for particular Internet use applications will become ever more important for society. The unequal benefits of Internet use as portrayed in Table 2.1 and Figure 2.5 are most likely caused by differences of skills, motivations and preferences of use that belong to a particular age, gender, educational level and occupation. Here it has to be admitted that seniors are at a disadvantage concerning some applications in Table 2.1 as they most likely search fewer jobs and partners online than younger people. However, this does not apply to other applications. The same survey revealed, for example, that young people also obtain much more information about their medical illness via the Internet than elderly people, who clearly need this information more (van Deursen and van Dijk, 2011).

According to a relational view of inequality differences of physical access (connectivity), skills and usage will become much more strategically important in a network society. A network society can be defined as a society that is increasingly based upon a combined infrastructure of social

and media networks (van Dijk, 1999, 2006b, 2012). In this society, occupying particular positions and having relations with this position become decisive for one's place, opportunities and chances in society (van Dijk, 2005). Access to and being able to use social and media networks increasingly merge in a network society. Those who have less connection in social networks usually also have less access to and ability to use media networks such as the Internet. Inclusion and exclusion in both social and media networks combined might be a powerful creator of structural inequality in the network society. It could create the following tripartite structure.

The core of this concentric picture of a network society portrays an information elite of about 15 percent of the population in high-access developed societies that has very dense and overlapping social and media networks. They are people with high levels of income and education, they have the best jobs and societal positions and they have more than 95 percent Internet access. These elite are accustomed to living in dense social networks. They are extended with a large number of long-distance ties that are part of a very mobile lifestyle.

The majority of the population (50 to 60 percent) in these societies has fewer social and media network ties and less Internet access, skill and use. The Internet applications used are of a relatively less serious and more of an entertainment kind as in the case of the usage gap thesis discussed earlier.

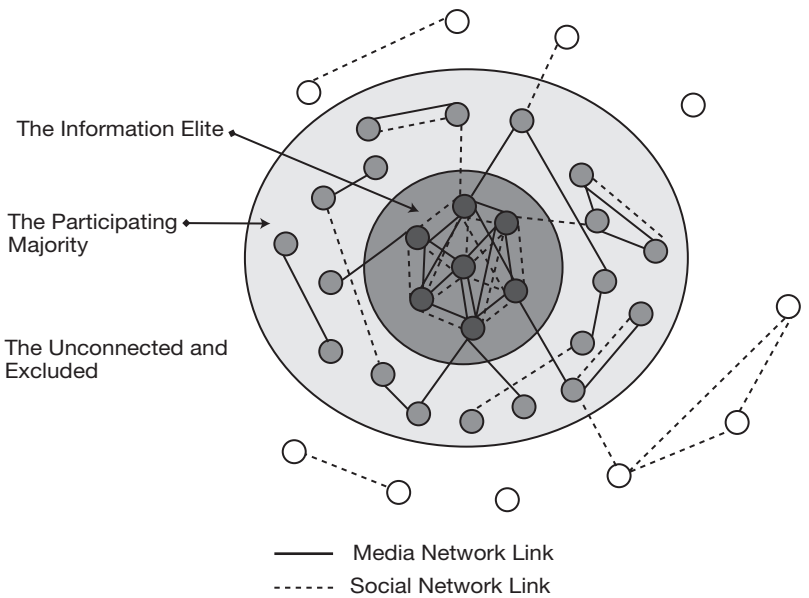

Figure 2.6 Potential tripartite structure of the network society. Source: van Dijk (1999, 2006, 2012)

Finally we have the unconnected and excluded part of society that is relatively isolated in terms of both social networks and media network connections. They comprise at least a quarter of the population of (even) developed societies. They consist of the lowest social classes, the unemployed, particular elderly people, ethnic minorities and a large group of migrants. They participate considerably less in several fields of society.

Such a dark picture of structural inequality does not have to appear. The inequalities of the digital divide and digital skills can be mitigated by deliberate policies for the labor market, for the training of employees and for educational improvements at all levels, including adult education (see van Dijk, 2005, for a complete policy program).

References

ARD/ZDF-Arbeitsgruppe Multimedia. (1999a). ARD/ZDF-online-studie 1999: Wird online alltagsmedium? [ARD/ZDF online study: Is online becoming an everyday medium?]. *Media Perspektiven* 1999(8), 388–409.

ARD/ZDF-Arbeitsgruppe Multimedia. (1999b). Nichtnutzer von online: Einstellungen und zugangsbarrieren. Ergebnisse der ARD/ZDF-offline-studie 1999 [Online nonusers: Attitudes and access barriers. Results of the ARD/ZDF offline study 1999]. *Media Perspektiven* 1999(8), 415–422.

Bonfadelli, H. (2002). The Internet and knowledge gaps: A theoretical and empirical investigation. *European Journal of Communication*, 17(1), 65–84.

Brosnan, M. J. (1998). The impact of computer anxiety and self-efficacy upon performance. *Journal of Computer Assisted Learning*, 14, 223–234.

Cho, J., de Zúñiga, H., Rojas, H. and Shah, D. (2003). Beyond access: The digital divide and Internet uses and gratifications. *IT & Society*, 1(4), 46–72.

Chua, S. L., Chen, D. T. and Wong, A. F. L. (1999). Computer anxiety and its correlates: A meta-analysis. *Computers in Human Behavior*, 15, 609–623.

de Haan, J. (2003). IT and social inequality in the Netherlands. *IT & Society*, 1(4), 27–45.

DiMaggio, P., Hargittai, E., Celeste, C. and Shafer, S. (2004). From unequal access to differentiated use. In K. Neckerman (ed.) *Social Inequality*. New York: Russell Sage Foundation, 355–400.

Dutta-Bergman, M. (2005). Access to the Internet in the context of community participation and community satisfaction. *New Media and Society, 17*, 89–109.

Finn, S. and Korukonda, A. R. (2004). Avoiding computers: Does personality play a role? In E. Bucy and J. Newhagen (eds.), *Media access: Social and psychological dimensions of new technology use*. London: LEA, 73–90.

Hargittai, E. (2002). The second-level digital divide: Differences in people's online skills. *First Monday*, 7(4). Retrieved from http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/942/864

Horrigan, J. and Rainie, L. (2002). Getting serious online: As Americans gain experience, they pursue more serious activities. Washington DC: Pew Internet and American Life Project. Retrieved August 28, 2004, from http//:www.pewinternet.org

Hudiburg, R. A. (1999). Preliminary investigation of computer stress and the big five personality factors. *Psychology Reports*, 85, 473–480.

Katz, J. E. and Rice, R. E. (2002). Social consequences of Internet use, access, involvement, and interaction. Cambridge, MA, US: MIT Press.

Lenhart, A., Horrigan, J., Rainie, L., Allen, K., Boyce, A., Madden, M. and O'Grady, E. (2003). The ever-shifting Internet population: A new look at Internet access and the digital divide. Washington, DC: Pew Internet and American Life Project. Retrieved August 28, 2004, from http//:www.pewinternet.org.

Merritt, K., Smith, D. and Renzo, J. C. D. (2005). An investigation of self-reported computer literacy: Is it reliable? *Issues in Information Systems* 6(1), 289–295.

Norris, P. (2001). Digital divide, civic engagement, information poverty and the Internet worldwide. Cambridge, UK: Cambridge University Press.

NTIA (National Telecommunications and Information Administration). (2000). Falling through the Net II: Toward digital inclusion. Retrieved September 29, 2004, from http://www.ntia.doc.gov/ntiahome/fttn00/contents00.html

NTIA (National Telecommunications and Information Administration). (2002). A nation online: How Americans are expanding their use of the Internet. Retrieved September 29, 2004, from http://www.ntia.doc.gov/ntiahome/dn/index.html.

Park, H. W. (2002). The digital divide in South Korea: Closing and widening divides in the 1990s. *Electronic Journal of Communication/Revue de Communication Electronique*, 12(1 & 2). Retrieved September 28, 2004, from http://www.cios.org/www/ejc

Rockwell, S. and Singleton, L. (2002). The effects of computer anxiety and communication apprehension on the adoption and utilization of the Internet. *Electronic Journal of Communication/Revue de Communication Electronique*, 12(1). Retrieved June 12, 2004, from http://www.cios.org/www/ejc

Rojas, V., Straubhaar, J., Roychowdhury, D. and Okur, O. (2004). Communities, cultural capital and the digital divide. In E. Bucy and J. Newhagen (Eds.), *Media access: Social and psychological dimensions of new technology use*. London: LEA, 107–130.

Stanley, L. (2001). Beyond access. Retrieved March 11, 2004, from www.mediamanage.net/Beyond_Access.pdf

Steyaert, J. (2000). Digitale vaardigheden: Geletterdheid in de informatiesamenleving [Digital skills: Literacy in the information society]. The Hague, Netherlands: Rathenau Instituut.

Steyaert, J. and de Haan, J. (2001). Geleidelijk digital: Een nuchtere kijk op de sociale gevolgen van ICT. Den Haag, Netherlands: Sociaal en Cultureel Planbureau.

Talja, S. (2005). The Social and discursive construction of computing skills. *Journal of the American Society for Information Science and Technology*, 56(1): 13–22.

Tichenor, P. J., Donohue, G.A. and Olien, C.N. (1970). Mass media flow and differential growth in knowledge. *Public Opinion Quarterly,* 34(2): 159–170.

Tilly, C. (1999). *Durable Inequality*. Berkeley, CA, US: University of California Press.

UCLA, University of California, Los Angeles, Center for Communication Policy. (2003). The UCLA Internet report: Surveying the digital future, year three. Los Angeles: UCLA. Retrieved March 2, 2004, from http://www.ccp.ucla.edu/pages/internet-report.asp

United Nations Statistics Division. (2004). Millennium indicators database: Personal Computers and Internet users per 100 population (ITU estimates). Retrieved March 11, 2004, from http://millenniumindicators.un.org/unsd/mi/mi_indicator_xrxx.asp?ind_code=48

van Deursen, A. (2010). *Internet skills, vital assets in an information society*. Doctoral Thesis: Enschede: University of Twente, Netherlands.

van Deursen, A. and van Dijk, J. (2010). *Trendrapport computer en Internetgebruik 2010, een Nederlands en een Europees perspectief* (Trendrapport Komputer und Internet Benutzung, Ein Niederländisches und Europeïsches Perspectiv). Enschede: Universtity of Twente. Available: www.cfes.nl.

van Deursen, A. and van Dijk, J. (2011). *Trendrapport computer en Internetgebruik 2011, een Nederlands en een Europees perspectief* (Trendrapport Komputer und Internet Benutzung, Ein Niederländisches und Europeïsches Perspectiv). Enschede: Universtity of Twente. Available: www.cfes.nl.

van Deursen, A. and van Dijk, J. (2013). *Digital skills: The key to the information society*. Thousand Oaks, CA, US: Sage.

van Dijk, J. (1999). *The network society: Social aspects of new media,* 1st Edition. London: Sage.

van Dijk, J. (2003). A framework for digital divide research. *Electronic Journal of Communication/Revue de Communication Electronique*, 12(1). Retrieved September 30, 2004, from http://www.cios.org/getfile/vandijk

van Dijk, J. (2005). *The deepening divide: Inequality in the information society*. London: Sage.

van Dijk, J. (2006a). Digital divide research, achievements and shortcomings. *Poetics, 34*, 221–235.

van Dijk, J. (2006b). *The network society: Social aspects of new media,* 2nd Edition. London: Sage.

van Dijk, J. (2012). *The network society: Social aspects of new media,* 3rd Edition. London: Sage.

van Dijk, J., Liset, J., de Haan, J. and Rijken, S., (2000). *Digitalisering van de leefwereld: Een onderzoek naar informatie en communicatietechnologie en sociale ongelijkheid* [Digitization of everyday life: A survey of information and communication technology and social inequality]. The Hague, Netherlands: Sociaal en Cultureel Planbureau.

van Dijk, J. and van Deursen, A. (2012). A social revolution online? The digital divide shifts to gaps of usage. Paper presented at the 62nd Annual Conference of the International Communication Association, May 24–28, 2012, Phoenix, US.

Warschauer, M. (2003). *Technology and social inclusion: Rethinking the digital divide*. Cambridge, MA, US: MIT Press.

Wellman, B. and Berkowitz, S.D. (Eds.). (1988). *Social structures, A network approach*. London: JAI Press.

Zillien, N. and Hargittai, E. (2009). Digital distinction: Status-specific Internet uses. *Social Science Quarterly,* 90(2): 274–291.

Note

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