# Digital Divide: Impact of Access [1]

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Access to digital media is defined as the full process of appropriation of technology by users. It starts with motivation and attitudes and moves on to the process of finding physical access. Then, having learned sufficient digital skills, users will realize a particular frequency and diversity of usage of digital media. In all these phases significant divides are observed. After the year 2000 the importance of digital divides shifted from physical access to skills and usage. However, the main media effects of all these divides are unequal benefits and unequal participation in society.

Key words: digital media; diversity; information and communication technology; media literacy; public participation; the concept

The concept *digital divide* is usually defined as the gap between people who do and do not have access to forms of information and communication technology. These forms are primarily computers and the Internet. Sometimes cellphones, particularly smart phones and other digital hardware and software, are also included. The concept figures in discourses about social and information inequality. Inclusion and exclusion in particular social units are common concepts in this respect.

The term originated in the mid-1990s in the United States. It first appeared in an official publication by the US Department of Commerce's National Telecommunications and Information Administration (1999). Unfortunately, the term *digital divide* has caused much confusion. In fact it is a metaphor that has inspired at least four misunderstandings. First, the metaphor suggests a simple distinction between two divided groups with a yawning gap between them. Second, it suggests that this gap is difficult to bridge. Third, it can imply absolute inequalities between those who are included and those who are excluded, whereas inequalities are of a more relative kind. Finally, the digital divide is not a static and permanent condition. These misunderstandings will be clarified in the following sections.

## Research history

Digital divide research is an interdisciplinary activity that started around the year 2000 and primarily figures in communication science, sociology, psychology, economics, and education science. Communication science focuses on access to and usage of digital media. Sociology emphasizes social inequality in terms of resources, all kinds of capital, and participation in society. Psychology deals with attitudes and motivations to use digital media and investigates phenomena such as computer anxiety and technophobia. Economics highlights the diffusion of the innovations concerned. Finally, education science stresses information or digital literacy.

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In the first years of digital divide research (1999–2002), the investigation of the concept concentrated on a narrow meaning of *access*. This was in fact physical access: obtaining the hardware and software of digital media and a connection to the Internet. Physical access was correlated with general demographics such as income, level of education, age, gender, and race. The frames were sociological (social capital) and economic (diffusion of a technology in the market and the adaptation choices of consumers).

After some time, communication and media scholars in particular called attention to issues "beyond access": skills needed for users (Hargittai, 2002), different usages of the Internet (Bonfadelli, 2002), and the complexity of access reconceptualized as a full appropriation of technology beyond physical access (Van Dijk & Hacker, 2003). For this redirection of research, Hargittai (2002) coined the term *second-level divide*. Van Dijk (2005) used the term *deepening divide* to emphasize that the problem of digital inequality does not end after physical access has been attained but actually starts when the use of digital media is incorporated into daily life. In the decade between 2005 and 2015, the second-level divide became the focus of most digital divide research.

However, until about 2005 the nature of digital divide research was overwhelmingly descriptive (Van Dijk, 2006). It lacked theory. The demographics of income, education, age, gender, and ethnicity were emphasized and correlated to (physical) access. Correlations with access were not sufficient to find the causes of access, let alone the effects, which in fact were ignored. Or, it was simply assumed that not having access would lead to social disadvantage or deprivation. So there is no tradition of media effects in digital divide research. Only after 2005 have a number of scholars observed the effects of access and usage on social behavior, relations, and societal effects. These effects will be the focus here.

## Access as a process of appropriation of technology

The concept *access* is used in both narrower and broader senses. The most common narrow meaning is physical access, as defined. However, a broader meaning is more appropriate to describe and explain all kinds of digital divide including the second-level divide. Such a meaning is the whole process of appropriation of a particular technology. Here, physical access is preceded by the motivation, attitude, and expectation of getting physical access. Further, physical access is not a single decision to adopt and purchase a particular technology but a continuing process of getting access to new versions of hardware and software, peripheral equipment, and subscriptions. Obtaining physical access makes no sense when people are not able to use the technology. So, skills and competencies are also needed for access. When people have learned to operate and understand a technology, the purpose of access and the final goal of appropriating the technology will be looked for: actual usage.

In social and communication science, these stages of access are dealt with by technology acceptance theories. More psychological theories such as the technological acceptance model and the theory of planned behavior deal with access focusing on motivation and attitudes. Examples are perceived usefulness, ease of use, and subjective norms that affect behavioral intention to gain access to digital media. As soon as acceptance reaches the stage of decision making, adoption theories such as diffusion of innovation are used. These are theories more rooted in sociology and communication and also focus on social and contextual factors.

In the postadoption stages (initial and continuous use), social, cultural, and communication theories figure. Examples include domestication theory, uses and gratification theory, and social cognitive theory, leading to the model of media attendance (LaRose & Eastin, 2004).

All these theories of acceptance or access are linked to a particular methodological point of view by investigating social and information (in)equality. The descriptive nature of digital divide research is mainly inspired by methodological individualism, which leads to individualistic notions of (in)equality. Here differential access is related to individuals and their demographics. An alternative notion of (in)equality uses a relational or network approach (Wellman & Berkowitz, 1988). Here the prime units of analysis are not individuals but positions of individuals and relationships between them. Inequality is not primarily a matter of individual attributes but of categorical differences between groups of people such as managers and executive personnel, males and females, blacks and whites; these groups try to appropriate the technology first, hoard its opportunities, and reinforce their positions in relation to the other category. This view was developed by the sociologist Charles Tilly (1998) and is backed up by a network perspective (Kadushin, 2012). This approach is inspired by the rise of social networking and the Internet. Here all stages of access are not primarily related to individual attributes but to social support and relationships.

## A theoretical framework for analyzing access

Van Dijk has developed a framework for analyzing access that is backed by a particular theory but that is also suitable to serve as a steppingstone for a neutral exposition of highlights of digital divide research in general because it is so broad. Van Dijk calls his theory *resources and appropriation theory*. It is a version of structuration theory (resources) and acceptance theory (appropriation). Most other theories can also be located somewhere in parts of this framework, as will be shown in the remainder of this entry.

The core argument of the theory is portrayed in Figure 1 and can be summarized in the following statements:

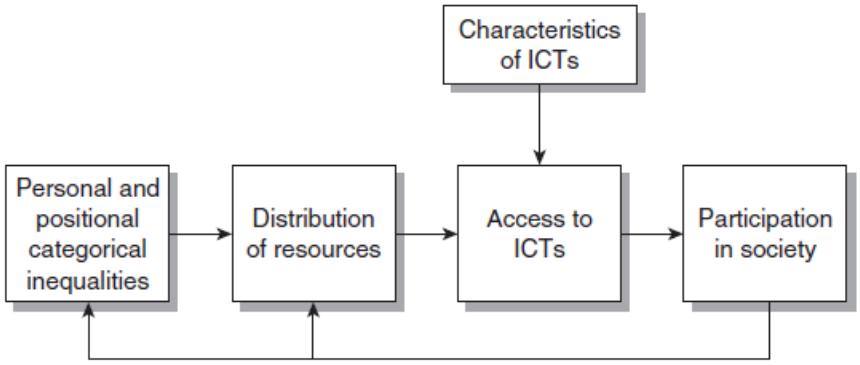
1 Categorical inequalities in society produce an unequal distribution of resources.
2 An unequal distribution of resources causes unequal access to digital technologies.
3 Unequal access to digital technologies also depends on the characteristics of these technologies.
4 Unequal access to digital technologies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

The following sections will outline a general version of this framework of digital divide research. For this purpose, the most common concepts used with these statements are as follows (for others, see Van Dijk, 2005). The *personal* categorical inequalities that can be frequently observed in digital divide research are age (young/old), gender (male/female), race/ethnicity(majority/minority), intelligence (high/low), personality (extravert/introvert; self-confident/not self-confident), and health (able/disabled). The *positional* categorical inequalities in-

clude labor position (entrepreneurs/workers; management/employees; employed/unemployed), education (high/low), household (family/single person), and nation (developed/developing). In most observations the first of these categories (e.g., young and male) have more access than the second. The core of the model shown in Figure 1 is *access to ICTs*. This consists of a sequence of phases that appear in the subtitles of the next section.

**Figure 1. A Causal Model of Resources and Appropriation Theory**

(Source: van Dijk 2005, p. 15)




## Most important observations in successive phases of access

### *Motivation, attitude, intention, and social support*

With the advent of any new technology, the motivation, attitude, and intention to accept it are relatively low. In the 1980s and 1990s many people gave answers in survey questions to the effect that they did not need a computer or an Internet connection. Many people were afraid about the coming computer age; negative and critical views prevailed. However, when the technology began to diffuse through society more widely, the motivation to obtain the digital media increased quickly. Even very elderly people and people with low education were motivated to gain access, often afraid of being excluded from society or of not being able to communicate with grandchildren or family and friends. For example, German and US surveys (ARD/ZDF-Arbeitsgruppe Multimedia, 1999; National Telecommunications and Information Administration, 2000) showed that the main reasons for the refusal were no need, or no significant usage opportunities; no liking of the medium, or rejection of the medium (the downsides of the Internet and computer games); lack of skills; and lack of money. At that time, in these surveys half of the respondents not connected to the Internet refused to get access. However, 10 years later, the situation was very different; for example, in the Netherlands, 96% of the population was motivated to have access to the Internet in 2012 (Van Deursen & Van Dijk, 2013).

The factors explaining sufficient motivational access are both of a social or cultural and of a mental or psychological nature. An early social explanation was that "the Internet does not have appeal for low-income and low-educated people" (Katz & Rice, 2002, p. 93). To dig deeper into the reasons for this lack of interest it seemed appropriate to complement 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, 2003) 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 as something that is not "cool" and "something girls do") and of particular minority and working-class lifestyles. As of the mid-2010s, working-class and low-educated people have caught up to the other groups and sometimes even spend more time on the Internet overall than highly educated people (Van Deursen & Van Dijk, 2013).

In terms of technology acceptance theory, motivations and attitudes regarding the intention to get access can be explained by factors such as perceived usefulness, ease of use, and subjective norms—the expectation of important others that one will have to use digital media—related to the media concerned. All these factors get stronger when the technology matures and merges into daily life.

However, some adverse phenomena remain, though they have become less pronounced. Examples are the phenomena of computer anxiety and technophobia. Computer anxiety is a feeling of discomfort, stress, or fear experienced when confronting computers (Chua, Chen, & Wong, 1999). Technophobia is a fear of technology in general and distrust in its beneficial effects. In the first years of the millennium more than 30% of new American Internet users reported that they were moderately to highly technophobic (UCLA, Center for Communication Policy, 2003, p. 25). Computer anxiety and technophobia still are major barriers to computer and Internet access in many countries, especially among seniors, people with a low education level, and a part of the female population.

Not only social norms but also social support by people nearby or in one's social network affect motivation and intention to accept a new medium (Stewart, 2007). They influence all of the following phases: physical access, skills access, and usage access. The positional categories of being a member of a particular household, workplace, school, nation, or neighborhood are supportive or not for access of all kinds. Families with school-going children are very motivated to purchase, learn about, and use a computer and Internet connection. They are obligatory in schools and workplaces. Colleagues and fellow students assist others to learn the needed skills and use particular applications. Finally, support and opportunities are completely different in developed and developing countries and in rich and poor neighborhoods.

### *Physical access*

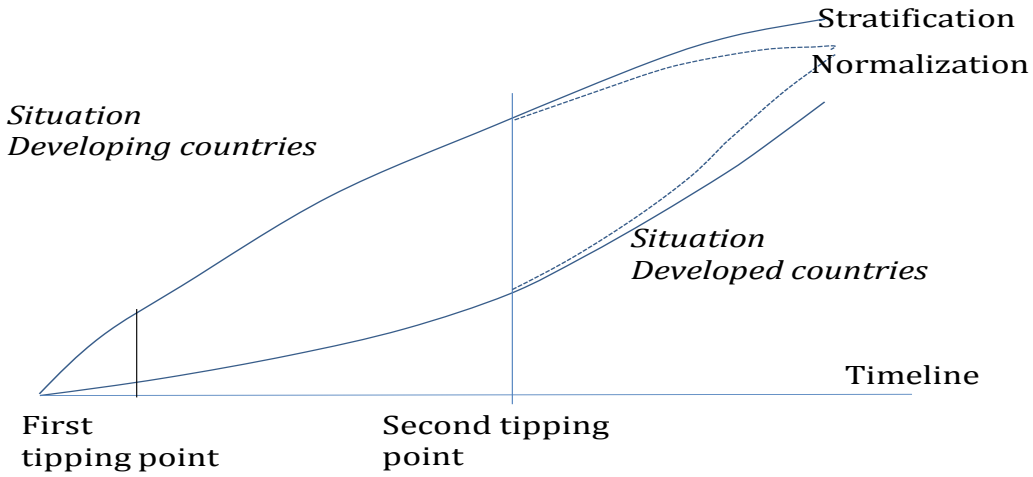
The overwhelming part of digital divide research focuses on the observation of divides of physical access to personal computers and the Internet among demographic categories that are obvious in this respect: income, education, age, gender, and ethnicity. The first nationwide surveys in the developed countries at the end of the 1990s and the turn of the millennium 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 had already become more or less closed in those years. Complete closure of this gap only happened in the North American and northwestern European countries. Regarding age, the relationship was curved: physical access culminated in the age group of 25 to 40 and declined afterwards.

From the years 2000–2002 onward the physical access divides in the East Asian, North American, and Northern European 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 (Eurostat, 2005–2010; National Telecommunications and Information Administration, 2002). However, in the developing countries, the physical access divide is still widening and will continue to do so until the same turning point arrives in those countries as was reached in the developed countries (Millennium Development Goals Indicators (2015); annual ITU figures of global PC and Internet connection: http://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx).

The evolution of the physical access digital divide over time (about half a century) is portrayed in Figure 2. At a first tipping point, physical access in a country accelerates. In addition, at that time, the gap between early accessors and others (e.g., people with high and low education and income) will start to grow. At a second tipping point, when the majority of a population in a country has gained access, the gap diminishes between the social categories that have access. As of the mid-2010s, developing countries in general are between the first and the second tipping points, and developed countries are after the second tipping point. The end of the evolution of physical access is contested by digital divide research. Some anticipate a point of normalization when nearly 100% will have access. Others foresee permanent stratification, where particular social categories will stay ahead in accessing more advanced and expensive digital media while other will lag behind. See Norris (2001) for the normalization and stratification theses.

**Figure 2. Evolution of the Digital Divide of Physical Access in Time**
(Source: van Dijk (2005), p. 68)



The theoretical variables proposed to be affecting these gaps of physical access were initially thought to be manifestations of having more or less economic, social, and cultural capital (Rojas et al., 2004). Others defend a resource-based approach (Dutta-Bergman, 2005). Van Dijk (2005) combines a resource-based approach and a network approach, together focusing on social positions, resources, and relations in the labor market, education, and households.

### *Skills access*

After having obtained physical access, people need skills to command and use digital media. Some call these skills *digital* or *media literacy*; others call them *digital skills*. Another distinction is made between operational or instrumental skills needed to command digital media (medium-related skills) and substantial skills geared toward finding information, communicating, acting, and creating (content-related skills). In popular opinion and in many scholarly concepts, medium-related skills predominate. The assumption is that being able to operate the medium and navigate the Internet means access has been accomplished. However, all contemporary researchers of digital skill or media literacy have found that skills such as information retrieval, communication, and content creation are in fact more important in using digital media. Having medium-related skills is only the necessary precondition to apply these content-related skills.

Very little scientific research has been done on the actual level of digital skills people possess. Unfortunately, it is extremely difficult to determine this 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 & Van Deursen, 2014). So far, there have been only a few estimates of skills. A number of large-scale surveys have revealed dramatic differences in skills among populations, including among populations of countries with high computer and Internet access (Hargittai, 2002; Warschauer, 2003). However, these surveys measured the *actual* level of digital skills possessed via questions asking respondents to *estimate* their own level of digital skills. This kind of measurement has obvious problems of validity (Hargittai, 2002; Van Deursen, 2010). The more valid approach, to actually observe or test performance of skills in experimental conditions, is very labor intensive (Van Deursen, 2010).

Digital skills research shows significant differences in performance between people of different ages and education. The most important factor is level of education (Hargittai, 2002; Van Deursen, 2010). People with higher education perform better in all skills than people with lower education. 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 are different. Here people of medium age and seniors do better on the condition that they have adequate medium-related skills (Van Deursen, 2010). In none of the series of performance tests done so far have any gender differences been observed (e.g., Hargittai & Shafer, 2006; Van Deursen, 2010) despite the fact that in pretest questionnaires men rated their skills higher than women did.

*Usage access*

The last stage of access is its primary goal: usage. This can be measured as usage time and frequency; number and diversity of usage applications; (with networks) broadband or narrowband use; and more or less active or creative use. Usage time and number of application increase with social categories as digital media merge into daily lives. While in the 1980s and 1990s people with high education were much more likely to use these media, currently in some developed countries people with low education spend more time on the Internet than people with high education (Van Dijk & Van Deursen, 2013. In this case it is important to know what these people are doing on the Internet. This is a matter of the number and diversity of applications used.

Here several researchers have found a so-called *usage gap* in the diversity of applications between people of different ages, education levels, and genders. Currently, the age usage gap for the use of particular applications is bigger than the gap for education (Van Deursen & Van Dijk, 2013. This will become smaller when the generations shift. The gender gap of usage is already relatively small (Helsper, 2010). Probably, the education usage gap will be the most persistent. A striking observation is that people with higher education are significantly using the advanced applications of digital media for capital-enhancing goals relating to work, career, and study while people with lower education are using the simple applications of entertainment, commerce, and messaging (Bonfadelli, 2002; Cho et al., 2003; Van Deursen & Van Dijk, 2013 Van Dijk, 2005; Zillien & Hargittai, 2009).

The thesis of the usage gap clearly relates to the *knowledge gap* thesis of the 1970s (Tichenor, Donohue, & Olien, 1970), which stated that the highly educated derived more knowledge from the mass media such as television and newspapers than the low educated. However, 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.

Several researchers have proposed or derived (by factor or cluster analysis) various classifications of Internet use (Kalmus, Realo, & Siibak, 2011; LaRose & Eastin, 2004). The most mentioned application clusters are information seeking, news, personal development (education), leisure, commerce and transactions, social interaction and networking, and gaming. All these applications are ever more frequently used on the Internet. Simultaneously, they are differently used by particular social categories.

## The benefit of access: participation in all societal domains

So far, digital divide research has completely focused on the causes of these types of access, only looking at correlations with demographics. But the strongest media effect imaginable would be looking for consequences of having more or less access. This would mean paying attention to the benefits of (un)equal access. This is the direction in which access research should and probably will go. One of the first attempts was made by a survey in the Netherlands, where the investigators asked a large number of “yes” and “no” questions regarding the actual benefits of all kinds of participation in society (Van Deursen, Van Dijk, & Helsper, 2014). The goal was to test the causal relationship between information and communication technology access and participation shown in Figure 1.

Some of the results showed that, in terms of economic participation, people with access testified that they had found a job via the Internet as well as lower prices in buying and selling products. In terms of social participation they had met one or more friends whom they only met in person later, and some became members of an association. In terms of political participation they discovered a political party to vote for and vehicles for political opinion not found in traditional media. In terms of cultural participation they profited from more educational and entertainment opportunities. In terms of institutional participation they benefited more from public services and even from vital health services such as finding out about one's own disease and the best hospital.

Adding together all these kinds of benefits (Van Deursen, Van Dijk, & Helsper, 2014), it appeared that young and highly educated people profited more from the Internet than seniors and low educated people. The gender benefits were equal except for political participation, where males found more advantages.

## Future research

In future research the shift from the first to the second digital divide will probably be amplified. More and more research will be expected about a number of digital skills or media literacies and about actual use of digital media and their outcomes. The merger of these media in all societal domains and every part of everyday life will show what the effects will be in terms of type and level of access.

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