Digital Divide: Theoretical Review and Future Research Suggestions

The term "digital divide", initially referring to the gaps between people who do and people who do not have access to computers and/or the Internet, attracted extensive academic and public attention during the 1990s. As Internet penetration rates continued to grow, the original definition was considered as both limited in scope and hard to operationalize. Scholars later identified second-, third-, and even fourth-level digital divide by adding new dimensions to the original one. Attempts at integrating different layers of the divide, and examining the divide in larger social contexts were also made.

However, there are some gaps in the extant scholarship. First, few studies have looked at the extent to which all these layers of digital divide negatively impact people's life chances. As intuitive as it might seem, the claim that digital divide is a serious barrier still requires empirical data. If little impact is found, then there is no need to study, and try to bridge, the divides. Second, the majority of the literature merely focused on *describing* or *explaining* the divide. However, what's of greater social importance is to *bridge* the divide. Third, there seems to be a trend among scholars toward the integration of already identified dimensions into an all-encompassing definition, concept, or framework. The author of this paper does not belittle these efforts, but scholars in the field should recognize that (1) technologies are constantly emerging, and therefore, new dimensions of the existing divides or even completely new divides are bound to appear, (2) digital divide is a multilayered and multifaceted social phenomenon, so scholars

certainly *could*, and probably *should*, study it from different perspectives and within different frameworks.

Physical Access: First-Level Digital Divide

The term digital divide owns its origin to an unknown American source (Gunkel, 2003). It was first officially used in 1999 in a report by the US National Telecommunications and Information Administration, which defined digital divide as the gaps between information "haves" and "have nots" (NTIA, 1999). The concept then attracted enormous attention from scholars and policy makers. A large amount of research have demonstrated significant gaps among people of different demographic and socioeconomical categories: income, geographic location, race, age, gender, education attainment, employment status and family structure (NTIA 1995; 1998; 1999; 2000; and 2002; Hoffman & Novak, 1998; Hindman, 2000; OECD, 2001; DiMaggio, Hargittai, Celeste, & Shafer, 2004; Attewell 2001; Rice & Katz, 2003; Korupp & Szydlik, 2005; Jackson et al., 2008). Policy makers in the US responded to this social threat actively, introducing financial, legal and educational initiatives to narrow this gap in the American society (Attewell, 2001).

The introduction to and widespread use of this concept, in its initial sense of physical access, is certainly of great necessity and importance, as it pointed to a serious social problem and brought huge scholarly and government attention. However, this dichotomous definition is highly problematic. First, it neglects a continuum where a wide range of connectivity between "access" and "no-access" may be found (File, 2013). Second, it assumes, automatically and

problematically, that once having secured access, people will use and benefit the same way (Eastin, Cicchirillo, & Mabry, 2015), and they will remain connected forever (Gonzalez, 2016). Third, as a form of technological determinism (Gunkel, 2003), it implies that technology, i.e., having access, and technology alone, is enough to address the problem. Fourth, it lacks a clear operational definition, leading to different, and sometimes opposite, conclusions about the state of this divide (DiMaggio et al., 2004).

Moving Beyond Access: Second- and Third-Level Digital Divide

As the number of Internet users continued to grow in both developed and developing countries (Davidson, 2015) , many scholars proposed a shift of attention from the binary distinction between access and no-access to social, psychological and cultural factors that shape Internet use (DiMaggio & Hargittai, 2001; van Deursen & van Dijk, 2011; Gonzales, 2016; Büchi, Just, & Latzer, 2016). They argued that even if universal access is attained, digital divide, understood in a broader sense, persists as people possess varying levels of online skills (Hargittai, 2002), and engage in different activities (Teo, 2001; Hargittai & Hinnant, 2008), both of which then lead to diverse outcomes among users (van Deursen & Helsper, 2015). As Warschauer (2003) put it, “the key issue is not unequal access to computers but rather the unequal ways that computers are used” (p. 47). Therefore, it is important to examine differences *among* those who are already connected to the Internet (Hargittai, 2002). Differences in people’s skills and usage are called the “second-level digital divide”, whereas differences in outcomes are called the “third-level digital divide (Scheerder, van Deursen, & van Dijk, 2017).

Second-Level Digital Divide: Skills

Provision of physical access does not guarantee that people can equally have the necessary skills to enjoy the benefit of this connection (Zhong, 2011). As the access divide gradually closes, especially in developed countries, *skills divide* tends to grow (Hargittai, 2002). Online skill is originally defined as "the ability to efficiently and effectively find information on the Web" (Hargittai, 2002, p. 2), a command of technological "know how". However, this definition was criticized as too vague with limited practical use due to difficulty in operationalization. van Deursen and van Dijk (2009) proposed a framework where digital skills are classified into four types: operational, formal, information and strategic skills. Recognizing the importance of active participation in the age of web 2.0, van Dijk (2012) added communication skills and content-creation skills to the original framework. Based on these, Scheerder et al. (2017) identified four main groups of Internet skills: medium-related (software skills and operational skills), content-related skills, safety & security skills, and general skills.

Similar concepts were also formulated: digital competence (Calvani, Fini, Ranieri, & Picci, 2012; Hatlevik & Christophersen, 2013), media literacy (Erstad, 2010) and digital literacy (Gentikow, 2007). Digital competence is divided into three dimensions: technological, cognitive and ethical (Calvani et al., 2012). Digital literacy refers to technical, cognitive, and sociological skills necessary to solving problems in a digital environment, and is classified into five types: photo-visual literacy, reproduction literacy, information literacy, branching literacy, and socio-emotional literacy (Eshet-Alkalai, 2004). Lastly, Erstad (2010) identified five dimensions of

media literacy: 1) basic skills; 2) media as an object of analysis; 3) knowledge building in subject domains; 4) learning strategies; 5) cultural competence. Clearly, differences, either in competence or in literacies, will widen the divide among people.

Second-Level Digital Divide: Differentiated Use

Another important contributor to the second-level digital divide is differences in Internet use, specifically, variations in frequency of use and the types of activities performed (Scheerder et al. 2017). The logic here is clear: even when people have equal access and necessary skills to operate the devices, a divide remains between people who use it on a daily basis and those who log in twice a year, and between people who use it for study and those using it for gaming. DiMaggio et al. (2004) distinguished between activities that enhance capital (economic, social and political) and those that are mainly recreational. Teo (2001) divided online actives into four types: messaging, browsing, downloading and purchasing, and concluded that demographic factors are associated with the types of online activities people are involved in. van Deursen and van Dijk (2014) identified eight Internet usage types: information, news, personal development, social interaction, leisure, commercial transaction and gaming.

Overall, a disturbing trend was identified where those high in socioeconomic status (SES) are using the Internet for information or capital-enhancing activities, whereas those in low-SES groups are more likely to engage in activities for recreational purposes (Peter & Valkenburg, 2006; Zillien & Hargittai, 2009), creating a new form of digital divide called "*time-wasting gap*" (Richtel, 2012; Kassam, Iding, Hogenbirk, 2013). More disturbing is the finding

that SES is more closely related to the informational use of the Internet than to physical access to the Internet, and to the informational use of traditional media (Wei & Hindman, 2011), which means differences in Internet use not only *mirror*, but also, and more alarmingly, *magnify* known social and economic inequalities in the offline world we haven't addressed yet (van Deursen & van Dijk, 2014).

Frameworks transcending merely frequency of use and scope of activities were also introduced. For example, Livingstone and Helpsper (2007) believed that Internet use should better be thought of as a continuum, with gradations in not only frequency of use (non-users, low users, weekly users, and daily users) but also in *breadth* of use (basic users, moderate users, and all-round users). Similarly, Brandtzæg, Heim, and Karahasanović (2011) argued that *user type divide* is the new digital divide. By analyzing survey data of over 12,000 people from five European countries, they distinguished between five different user types: Non-Users (don't use the Internet at a regular basis); Sporadic Users (occasional and infrequent use); Instrumental Users (sue the Internet for radio, TV or games); Entertainment Users (use the Internet for various purposes on a daily basis at home or work); and Advanced Users. They also found, and more alarmingly, 60% of the population belongs to Non-Users or Sporadic Users. This means that in developed countries where most people already have access to the Internet, many of them are not making the most of it.

Another relevant concept is *Internet connectedness*. Jung, Qiu and Kim (2001) demonstrated that the traditional time-based measures of the intensity of Internet use cannot

reflect the real gaps between different SES groups. Therefore, they proposed the construct of Internet connectedness to reflect the "nature of individuals' connections to a technology and how these connections are embedded in and affected by the complex and multilevel communication infrastructure in which we live" (p. 513). The lasted version of *Internet Connectedness Index* (Jung, 2008) consists of five dimensions: scope of Internet activities; intensity of Internet activities; time spent online; computer miss; and Internet miss.

Integrating the First- and Second-Level Digital Divide.

DiMaggio et al. (2004) were among the first few scholars who proposed a new paradigm for research in digital divide. Believing that the term was no longer able to reflect the inequalities among those who already have access, they turned to a new concept: "digital inequality. They called attention to five broad dimensions of digital inequalities: technical apparatus (hardware, software, and connections); autonomy of use (access at home or work, monitored or unmonitored, during limited time or anytime); skill (knowledge of searching for and downloading information); availability of social support (access to advice from others); and purpose of use (capital-enhancing or merely entertainment) (DiMaggio et al, 2014; Warschauer, 2004). Another attempt at integrating the two divides is the *multifaceted model of Internet access* (van Dijk, 2012). According to this model, there are four types of *Internet access* (See Figure 1): motivation (the wish to have a computer and to be connected to the Internet); physical and material access; digital skills (managing hardware and software); and usage (frequency, diversity of usage applications, broadband or narrowband use, more or less active or creative use).

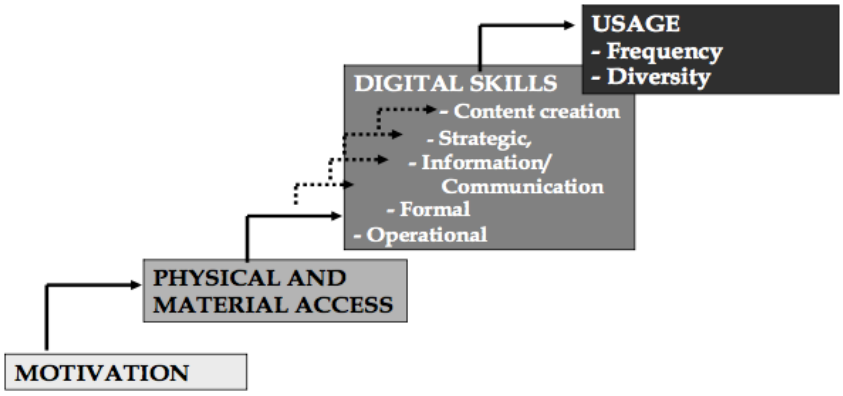

Figure 1. Access types. Four access types proposed by van Dijk (2012, p.61).

The Third-level Digital Divide

After people get access, even if they possess the same level of skills and engage in broadly similar online activities, they don't necessarily obtain the same level of offline benefits; disparities in returns and outcomes constitute the "outcome divide", or "third-level digital divide " (Wei, Teo, Chan & Tan, 2011; Scheerder et al., 2017).

van Deursen and Helsper (2015) distinguished between five types of outcomes of Internet use: economic, social, political, institutional and educational outcomes. Similarly, Amichai-Hamburger, McKenna, and Tal (2008) examined the outcomes by coining the term "*E-empowerment*": Internet users can empower themselves at four levels: personal (e.g., reframing identity), interpersonal (e.g., self-disclosure), group (e.g., decision-making tools), and citizenship level (e.g., political participation). Third-level digital divide is of great social impact, but it is currently underexposed and thus calls for wider scholarly attention (Scheerder et al., 2017).

A Second Thought on Physical Access

When most of the above mentioned scholars concluded that first-level digital divide is on the verge of being closed and thus proposed a shift of attention, other scholars argued that the gap in physical access still exists, both between and within countries. First, there exists a *grey divide*. For example, survey data showed that 75% of seniors aged 65 and older in Switzerland are not online (Friemel, 2014). While cost is no longer a concern, they are not using the Internet because they don't think it necessary or simply don't possess the necessary mental or physical capabilities.

Second, *technology maintenance* is the new divide. It's problematic to assume that once online, people will remain there forever. Gonzales (2016) demonstrated that low-income Americans will experience temporary disconnection because they 1) cannot reliably pay Internet bills; 2) are unable to repair broken hardware; and 3) have difficulty getting access to public Internet services. Access might be easily *obtained*, but it's hard to be *maintained*. Similarly, some Internet users, old people in particular, discontinue and abandon Internet use for various reasons (e.g., no interests anymore; no need; no motivation; eyesight problems, and broken hardware). Olphert and Damodaran (2013) called this phenomenon of *disengagement* as "the fourth digital divide".

Apart from gaps between age groups and difficulties to maintain Internet access, scholars are also concerned about Internet *speed*, the *place* of Internet use and the *devices*. These factors are found to be able to shape the *breadth* and *depth* of people's online activities. For example, people with higher-speed Internet engage in a wider range of activities than those

whose Internet connections are slow (Harrigan & Rainie, 2002; Madden & Rainie, 2003). However, cost is still a major barrier for low-income Americans against access to faster Internet services (Kang, 2016). In terms of *places*, only having access to Internet at school but not at home negatively impacts students' learning (Monahan, 2014). Some consider mobile telecommunications as a shortcut to narrowing digital divide (Loo & Ngan, 2012), but there is evidence the types of activities people engage vary with types of Internet access people enjoy, e.g., mobile-only or computer (Rideout & Katz, 2016). Specifically, those who have access through a computer are more likely to use it for capital-enhancing activities than those using only mobile Internet (Pearce & Rice, 2013). Thus, the devices of Internet connection and use do matter.

Beyond Digital Divide: Framing It from a Broader Perspective

To sum up, digital divide scholars discussed above have focused on *three Cs*—Connection, Capability and Content—and these three elements' interactions with demographic and socioeconomic variables. These findings and frameworks are certainly valuable as they point to the causes of digital inequalities based on which solutions can be provided. What is lacking, however, is to scrutinize the phenomenon of digital divide from a broader perspective, without which no underlying and more fundamental mechanisms perpetuating the existing, and more importantly future divide or inequalities can be identified.

Digital/Social Inequality

When scholars realized that digital divide is a form, or an extension, of social inequalities, they started to put it in a larger context. For example, built on Bourdieu's frameworks, Kvasny (2002) hypothesized that technical means, cultural, social and economic capital, and institutional reform give rise to digital inequality. She included time in this model to denote the persistence of the divide. Similarly, Witte and Mannon (2010) examined digital inequalities from three sociology perspectives: conflict, cultural and functionalist (See Figure 2).

From the conflict perspective, digital literacy and Internet skills will be taught in class-privileged families and institutions as an asset. According to cultural theory, low-status people are excluded from activities that are characteristic of individuals high in SES.

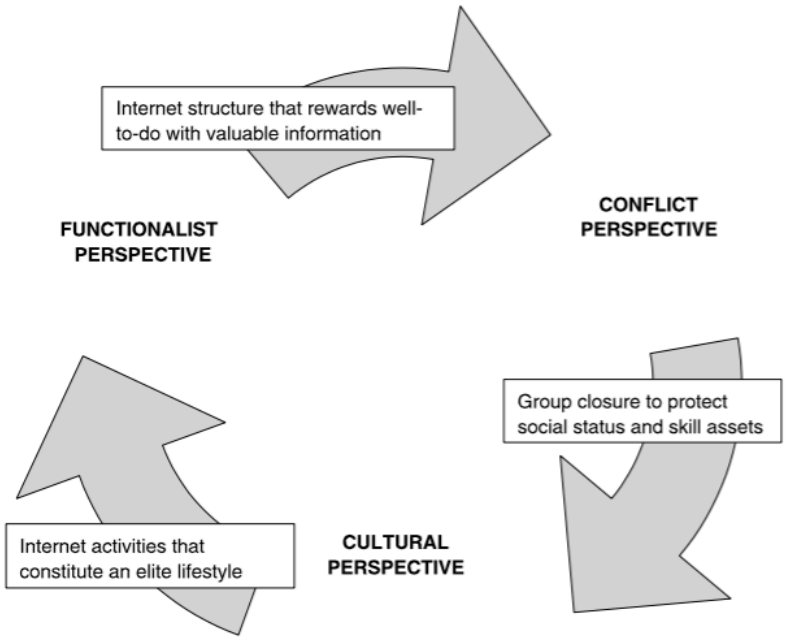

Figure 2. Integrated model of Internet inequality. A model proposed by Witte and Mannon (2010, p.147).

From a functionalist perspective, the structure of the Internet leads to inequality in rewards. Based on these three sociology perspectives, they developed an integrated model of Internet inequality in which "in the end, poor and rich alike might have access to the Internet, but only a privileged few are able to turn to the Internet as an asset, a lifestyle, and an incentive" (p. 147).

The *Corresponding Fields Model* proposed by Helsper (2012) explained the mechanism behind this worrisome pattern or vicious cycle. From the perspective of social and digital exclusion, she argued that the differences in four types of offline resources—Economic, Cultural, Social, and Personal Resources—lead to, and are reflected in, four types of digital engagement, i.e., Economic (e.g., commerce and finance), Cultural (participation and engagement), Social (networking and communication) and Personal (entertainment and leisure), implying a self-perpetuating cycle of social and digital inclusion. See Figure 3.

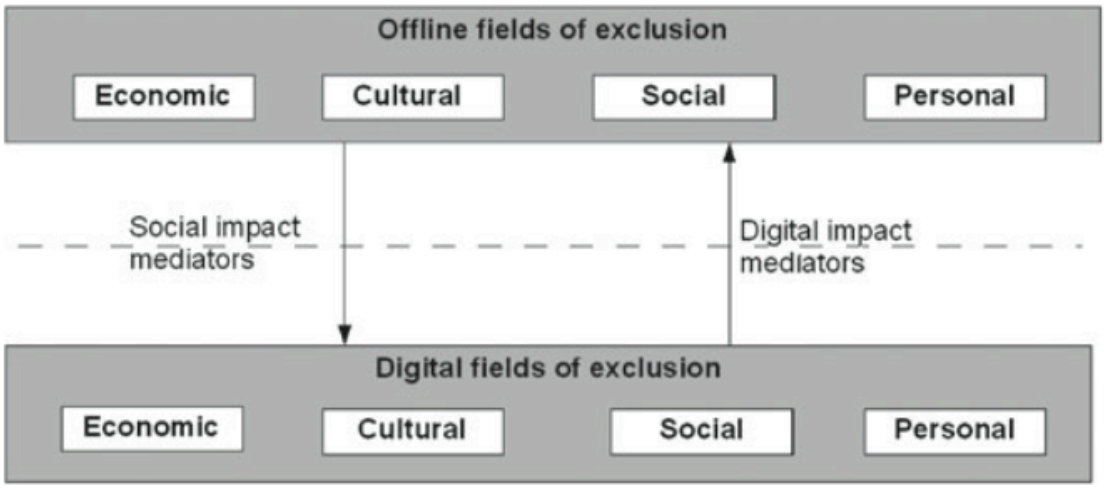

Figure 3. Corresponding Fields Model applied to digital divide, by Helser (2012, p.406).

Digital/Social Inclusion

Similarly, the concept of *digital inclusion* was constructed as a response to the limited scope in digital divide research. This term was based on the concept of *social exclusion*. Developed in policy terms in France during the 1970s, social exclusion originally referred to various forms of social disadvantages (De Haan, 2000; Notley & Foth, 2008).

Digital inclusion can be understood in two ways. In the broad sense of the term, it refers to policies designed to bridge the digital divide and to boost people digital literacy (Jaeger, Bertot, Thompson, Katz, & DeCoster, 2012). In the narrow sense of the term, it refers to an individual's ability or inability to participate in the determination of his or her own life chances (Warschauer, 2002).

The term, in its broader sense, was created when scholars and government officials came to realize that to merely *describe* digital divide is far from enough; what's more important is to *bridge* this divide. In the fourth report of the *Falling Through the Net* series, rather than sticking to the term digital divide, NTIA (2000) changed the title to *Toward Digital Inclusion*, shifting the focus to a "sociopolitical approach" (Notley & Foth, 2008, p. 6). In 2005, the UK government founded a Digital Inclusion Team who defined digital inclusion as "the use of technology, either directly or indirectly, to improve the lives and life chances of people and the places in which they live" (Digital Inclusion Team, 2007, p. 2). Overall, digital inclusion encompasses four inter-related concepts—access, use, empowerment, and engagement (Seale,

2009), and the goal of digital inclusion is to let everyone "access and use digital technologies effectively" (Thomas et al., 2016, p. 6).

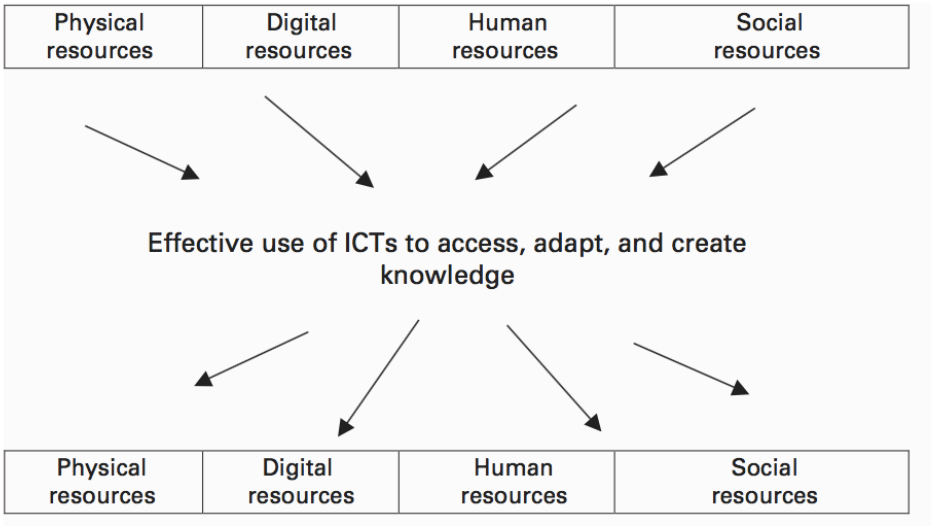

Figure 4. Technology for Social Inclusion. A framework proposed by Warschauer (2004, p.47).

The reason why they stressed *effectively* here is that when people don't use the technology effectively, their access to and use of ICTs is not *meaningful*. Because of this ineffectiveness in exploiting the technology, they will be excluded digitally and socially. This mechanism can be satisfactorily explained by the framework of *Technology for Social Inclusion* (See Figure 4) by Warschauer (2002; 2004). He argued that each of the four resources, i.e., physical (computers and telecommunications), digital (relevant content), human (literacy and education), and social resources (community and institutional support), is both a *contributor* to and also a *result* of effective use of ICTs (using the technology to access, adapt, and create

knowledge). If used effectively, Internet can help people promote these resources, and if exploited well, these resources can in turn promote social inclusion. However, "if handled poorly, these elements can serve as a vicious cycle of underdevelopment and exclusion" (Warschauer, 2004, p. 45).

Conclusion

Digital divide is a multilevel social problem. It is multilevel because disparities in access, a major concerns in its early stage, will be replaced by variations in skill, use and activities after access is massively distributed. It is a social problem because of its close relationships with elements in the larger social structure: class, culture, economy, government, etc. In light of the gaps in the extant literature, suggestions for future research in the field are as follows:

First, scholars should empirically examine to what extent access to or lack of ICTs hinder people's life opportunities. Studies and policies on digital divide all based themselves on an underlying argument that people will lose opportunities if not connected to the Internet or if lacking necessary skills. It's intuitively true, but we still need empirical data supporting the claim. Scholars could also conduct in-depth qualitative research in response to this gap.

Second, bridging the divide is more important than just describing or explaining it. Examinations on how many layers are there or how digital divide can be analyzed in a social context are certainly valuable. However, to solve this social problem, we need concrete social policies and studies measuring these policies' feasibility, effectiveness and applicability.

Third, different approaches and frameworks are welcomed. One single definition or framework is theoretically infeasible and practically unnecessary. Scholars should be encouraged to analyze digital divide within different and interdisciplinary frameworks.

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