Acknowledgments

I would like to thank my husband, my son, family, and friends for their never-ending support. I would be nothing without your encouragement and guidance through my various adventures.

Citation:

High Speed Internet Access and
The Digital Divide

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Key Points:

- The adoption of computers, mobile devices, social media, and the Internet has initiated the unintended consequence of the digital divide.

- The digital divide affects people of all ages all over the world.

- In order to close the digital divide, there needs to be a global shift in the perception of the Internet as a necessity versus a commodity.

Abstract

The digital divide is one of the unintended consequences of the rapid growth of innovations in computers, mobile devices, social media, and the Internet. The digital divide is caused by a lack of access to the Internet. This lack of access is caused by global racial, social, and economic inequalities. The digital divide affects all age groups and people worldwide. In order for the digital divide to be solved, there has to be a global shift in the perception of the Internet as a necessity versus a commodity. Internet providers, governments, organizations, and others will have to unite to lay infrastructure and connect the world digitally.
Brief History of High-Speed Internet Access

In the wake of the Cold War, Massachusetts Institute of Technology (MIT) computer scientist J.C.R. Licklider came up with the idea that would eventually become known as the World Wide Web (Jefferson Online, 2016). He wanted to connect computers across the world. He worked with other computer scientists and engineers at the U.S Department of Defense Advanced Research Project Agency (ARPA), and they came up with the ARPANET in late 1969. In the 1970s, Robert Kahn and Vinton Cerf created the Transmission Control Protocol/Internet Protocol (TCP/IP) to connect multiple computer networks (Jefferson Online, 2016). After this, Tom Truscott and Steve Bellovin expanded on TCP/IP and created the system USENET, full User Network, allowing users to transfer computer data via phone dial-up connections. In the 1980s, Dave Farber at the University of Delaware was able to take ARPANET and connect it to dial-up phone lines (Jefferson Online, 2016). Connecting to the Internet via dial-up phone lines was formally called PhoneNet, but commercially it was known as TeleNet. This innovation allowed people around the world to communicate via email. In the 1980s, local area networks, Ethernet, and domain names emerged. Finally, in the 1990s, the Internet began to become a global phenomenon.

Thomas Berners-Lee and others at the European Organization for Nuclear Research (CERN) developed Hypertext Markup Language (HTML). They gave rise to the World Wide Web after the discontinuation of ARPANET (Jefferson Online, 2016). With the birth of the World Wide Web, companies began to launch various websites and products, such as America Online, Amazon, Yahoo, and eBay. The 2000s saw the development of wireless Internet access and the evolution of the Internet, including Web 2.0, smartphones, Google, and YouTube (Jefferson Online, 2016). In the 2000s, an estimated 413 million people had access to the internet. In 2016, the number of Internet users exceeded 3.4 billion people. China, India, and the United States are the top countries with the most significant number of Internet users (Roser et al., 2015). High-speed Internet access is now nearly a prerequisite to online learning, most career paths, and social media participation.
Brief History of the Digital Divide

The digital divide concept emerged in 1995 in a report by the National Telecommunications and Information Administration based in the United States (Dijk, 2020). The term quickly spread globally. The world began to discuss and address it as a problem that needed to be solved. Jan van Dijk defines the digital divide as “a division between people who have access to and use digital media and those who do not” (Dijk, 2020). The digital divide affects society in multiple ways. The digital divide contributes to a lack of innovation and development in countries, businesses, society, and other aspects of life. This lack of innovation can lead to diminished economic growth for individuals, countries, and organizations. The digital divide leads to further societal inequalities by contributing to the exclusion of certain members of society. Since the Internet sends and retrieves information rapidly, members of society who do not have equitable access cannot adapt and innovate like those who have access (Dijk, 2020). Also, our global society is now dependent on Internet access to complete regular daily tasks at home and work. People without access cannot develop these crucial digital technology skills in society. This lack of access can negatively affect their ability to gain employment, complete daily tasks, and contribute to and keep up with societal change.

Internet Access, the Digital Divide, and the Effect on Education

Digital Divide in K-12 Education

Digital inequities in K-12 education have come to the forefront of educational organizations and institutions in recent years. Anderson and Perrin (2018) from the PEW Research Center used 2015 U.S. Census data to determine that 15% of households with students from the ages of 6 to 17 did not have access to the Internet. They also emphasize that Black and Hispanic households, especially those considered low-income, experience digital inequities more than other races. The COVID-19 pandemic exacerbated this issue. Vogels et al. (2020) also from the PEW Research Center, investigated how the COVID-19 pandemic has increased the digital divide in K-12
schools. They determined that about 22% of parents report that their school-age children have to use public Wi-fi Internet access to complete their schoolwork. Also, 21% of parents reported that their children cannot complete schoolwork because they do not have a computer. This dependence on technology and Internet access also brings up affordability problems for families with lower incomes and raises infrastructure concerns for rural populations (Vogels et al., 2020).

The digital divide translates into socioeconomic, racial, geographic, and neurodiverse disparities among K-12 students. A study completed by Vidgor et al. (2014) completed a study of at-home computer access for students in grades 5-8 enrolled in North Carolina Public schools. This study found that overall, 86% of these students reported that they had access to an at-home computer. Amongst these students, only 78% of Black students reported they had access to an at-home computer, while 90% of White students reported they had access. They also investigated which students participated in the school’s free or reduced lunch. It showed that out of the students that utilize this program, only 72% reported they had access to an at-home computer. Furthermore, PEW Research Center (2018) stressed that access to the Internet is and will continue to be an essential tool in education. Students’ quality of education will continue to be negatively affected if the digital divide is not considered and resolved.

Without rectifying this digital gap, students will not have the 21st century skills necessary to succeed in their future. Ballesta et al. (2018) referenced United Nations Educational, Scientific and Cultural Organization (UNESCO) data, which states that the effects of the digital divide will cause a significant decrease in the development of new knowledge and technologies. Schools should also use technology and the Internet to make lessons more engaging and relevant for their students. School divisions worldwide must implement strategies, plans, and initiatives to begin closing the digital divide. Vogel et al. (2020) additionally argue that at-home computers reduce the cost of academic and non-academic activities. Students with at-home computers can use the computer for entertainment purposes, researching information, and completing assignments. Students with access to and utilize computers and the Internet have more significant opportunities to achieve digital literacy and the technological and computing skills necessary for success in any future career path. According to Hampton et al. (2020), the digital divide causes students
to take longer to do homework, limits the help they receive when they do not have a proper understanding of a topic, have a lower grade point average, and perform at a lower level on standardized tests. This effect causes students with limited or no access to become less likely to attend college or university and also less likely to pursue a career in the critical Science, Technology, Engineering, or Mathematics fields.

**Adults and Seniors**

The digital divide also appears in adult education. Education for adults in today’s world is delivered electronically, whether in the workplace, college/university, vocational training, or other educational settings. The digital divide mostly affects adults with lower educational levels and socioeconomic status. Some of these adults have GEDs (tests of General Educational Development) or have dropped out of public education. Access to the Internet can provide these adults with formal education to learn in a low-stakes environment, such as their home, to practice skills they wish or need to improve (Centre for Educational Research Innovation, 2020). Adults seem to experience the digital divide from multiple perspectives. Adults see how a lack of access affects their lives at work and home. If these adults have children, they also see how it affects their children. This can be disheartening.

Often called the gray divide, the digital divide takes an interesting perspective on individuals over the age of 65. Only about 67% of this age group reported they used the Internet (Hunsaker & Hargittai, 2018). Some have adopted the Internet for entertainment, communication, or to complete daily tasks like banking or to learn something new. It has been shown that senior citizens with higher educational attainment are more likely to use the Internet regularly than those with lower educational attainment (Hunsaker & Hargittai, 2018). One factor that negatively affects the rate of Internet usage in this age group is health and cognitive decline (Hunsaker & Hargittai, 2018). As one's health declines, their ability to use the Internet also declines.

Senior citizens typically use the Internet for communication, health information, social media, banking, entertainment, and learning new skills. According to Quan-Haase et al. (2018), their study showed that this population group is divided into those that are reluctant or
apprehensive to use the Internet and range to those that are considered experts in digital technology. It is a myth that this age group does not want access, but similarly to the other age groups mentioned in this chapter, race and socio-economic status can contribute to a lack of Internet access despite the desire to have access.

**Internet Access, the Digital Divide, and its Effects Based on Geographic Regions**

As one examines how many Internet users each area has globally, Internet access and inequities become apparent. As of 2017, around half of the world’s population still does not have reliable Internet access, however, Internet access has been growing at unprecedented rates (Roser et al., 2015). Countries considered more developed and more affluent than other areas have a higher population that can access the Internet. On the other hand, populations in developing countries or with oppressive and restrictive governments, have less access to the global Internet than wealthier and less restrictive governments. (Roser et al., 2015). In Figure 1, North America, Europe, and Central Asia have consistently maintained a higher share of their total population that has access to the Internet in some capacity. South Asia is experiencing a spike in the population share with access to the Internet starting around 2015. While in contrast, sub-Saharan Africa has plateaued since 2015. (Roser et al., 2015). Globally, countries will have to continue improving their Internet infrastructure to keep up with the ever-increasing demand for high-speed Internet access.
The International Telecommunication Union, an agency of the United Nations, suggests that least developed countries are closing the digital divide by broadening global access to mobile access since now most of the world receives at least a 3G signal or better. Over 75% of the world’s population owns a mobile device, but in less developed countries, this number decreases to just about 56% of their population (International Telecommunication Union, 2018). Only about 11% of the world does not have access to these mobile networks. This 11% mostly comes from Africa, South America, and Southeast Asia due to lack of infrastructure and affordability. These areas often have sparse
population distribution, low income, and already lack traditional communication infrastructure that would enable connectivity (Del Portillo et al., 2020). The map confirms this in Figure 2. On the map, in 2017, most of Africa, the Middle East, and Southeast Asia have the lowest concentration of individuals who have accessed the Internet in some capacity in the past three months.

*Figure 2.*
Worldwide Internet users in 2017

**Number of internet users, 2017**

Individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc.

![Map of worldwide internet users in 2017](https://ourworldindata.org/images/2015/Internet.png)

*Source: OWID based on World Bank & UN World Population Prospects (2017)*

*Note.* Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina (2015) - "Internet*. Published online at *OurWorldInData.org.*

[https://ourworldindata.org/internet](https://ourworldindata.org/internet)
Conclusion: Guiding Change & Consequences

Closing the divide in terms of digital technology and equitable Internet access is a problem with multiple layers that need to be addressed by many stakeholders. These worldwide stakeholders include governmental departments, international economic and financial institutions, non-governmental organizations (NGOs), IT/telecommunications companies and organizations, educational institutions, public organizations, and providers of social and public services.

As mentioned previously, the International Telecommunication Union suggests that broadening mobile device access and mobile connection to 3G networks or better may be the way forward to assist in closing this gap (International Telecommunication Union, 2018). The International Telecommunication Union and the UN Broadband Commission have teamed up “to find scalable and replicable solutions to connect large rural offline populations at minimal costs and to find effective strategies for narrowing the usage gap across all regions” (Del Portillo et al., 2020). Verizon Wireless suggests that 5G is the answer to closing the digital divide. In the United States, only 65% of rural areas have access to high-speed Internet due to a lack of infrastructure (Verizon Wireless, 2021). Verizon Wireless insists that increased access to 5G could increase the gross domestic product of the United States by $800 billion in the next eight years. An increase in 5G high speed Internet access would create jobs, new business opportunities, and innovations that could now occur in the rural areas of the United States (Verizon Wireless, 2021). Forbes argues that the digital divide is not just a lack or inability to access the Internet; low-income households cannot afford to pay the providers. The lack of subscribers for Internet service providers affects their ability to expand their infrastructure and justify lowering costs (Mukherjee, 2022). If 5G is the cost-effective solution to the digital divide, then governments worldwide will have to continue to increase funding to bring broadband access to rural areas.

Further research into educational technology innovation's undesired, unintended, and indirect consequences is necessary (Rogers, 2003). Rogers’ classic work also describes the inevitability of unintended consequences of innovation, and the digital divide is the unintended consequence of Internet connectivity. The digital divide
will continue until there is a global perception change of high-speed Internet access as a necessity rather than a commodity. Instructional designers must continue considering if their audience has access to high-speed Internet. Internet service providers worldwide must continue installing and improving infrastructure to expand connectivity. Governments must continue expanding their funding to supplement costs for low-income families and infrastructure for Internet service providers. Every person in the world needs to be an advocate for greater access to high-speed Internet. While this is a huge undertaking, it is necessary as the world continues to connect via the Internet, especially for access to instructional and educational content.
References


