

The Digital Divide's Causes and Socioeconomic Implications with A Special Emphasis on COVID-19 Era

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Abstract

The digital divide, exclusion of people from having access or the literacy to use digital technologies, is a term introduced by the emergence of personal computers and the world-wide-web. Although the technology and internet access rates have risen sharply and the term had started fading away from literature since its introduction in 1995, COVID-19 shifting the world online had played a significant role in the interruption of many students' education, loss of jobs, and closing of organizations without a digital presence and/or reliable internet connection. The pandemic's impacts have raised the question, "is the digital divide still continuing in today's highly technological ecosystem?" This paper tries to answer this question and provides a brief history behind the digital divide, how and why it emerged, its social and economic impacts, how it shifted as years passed, possible solutions to close the gap, and what the future looks like in terms of global access to modern technologies. The findings of the study are expected to shed light on the digitalization policies of the governments to secure digital equality and inclusion in societies.

Keywords: Digital divide, Digital exclusion, Internet access, Social inequality, Digital, COVID-19.

Introduction

The world's digitalization process with the invention the world-wide-web and the development of technology in the last three decades have given rise to both variety and efficiency increases in information communication technologies (ICTs), which usually refer to "all devices, networking components, applications and systems that combined allow people and organizations to interact in the digital world" (Pratt, 2019). The utilization of these technologies has notable benefits for the economic development and advancement of various sectors which allows for the emergence of newer industries,

products, and business models (Kouadri & Cherif, 2020; Cruz-Jesus et al., 2016). From an individual perspective, ICTs could improve lifestyle, health, knowledge, job prospects, and so on; from business and government perspectives, on the other hand, applications of these technologies are key for macro and micro-level strategic actions as ICTs have been observed to advance labor productivity, innovation, and economic growth (Kouadri & Cherif, 2020; Cruz-Jesus et al., 2016) (Maryville Online, 2020; Lai & Widmar, 2020). However, despite the significant benefits these technologies offer in social and economic employment, healthcare, and knowledge-gathering, only 1% of the rural

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and around 30% of the urban population had access to the required technology to go online in the 1990s (Sparks, 2014). This "digital exclusion" and the unequal diffusion of ICTs believed to be caused by factors such as the difference between education and income levels, digital illiteracy, geographical restrictions (rurality levels), and lack of interest have resulted in the emergence of the term the "digital divide" (Steele, 2019; Maryville Online, 2020; Cruz-Jesus et al., 2016). Defined as "the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with respect to their opportunities to access information and communication technologies and the use of the Internet for a wide variety of activities" by OECD, the digital divide makes the already existing socioeconomic inequalities grow larger (Nieto, 2020). For instance, "college graduates are 10 times more likely to reap the daily benefits of computers and the internet than non-college graduates," "individuals with a \$75,000 annual income are 20 times more likely to access the internet compared with individuals with a \$30,000 annual income, and computer ownership and high-speed internet are 10 times more common for

wealthy families than low-income families"; those with greater access can use the power of information acquired by the internet and computers to be more advantaged in job-search, healthcare, finance, etc. (Maryville Online, 2020). Aware of this, many governments and private organizations have implemented various solutions, sharing discarded computers, donating newer devices, making Wi-Fi connection more accessible etc., to "bridge" the digital divide (Steele, 2019). As the realization of ICTs starting to become an essential part of daily economic and social activities—along with the global initiatives aimed to foster access—rose, so has the internet access and usage rates: In 2019, for example, the rates in developed countries like the United States, Finland, Canada, and France were 79.88%, 94.36%, 91.00%, and 90.17% respectively, with developing countries like Turkey, Costa Rica, and Brazil having a comparable rate to their developed counterparts with 88.30%, 88.64%, and 71.40%, respectively again. (OECD) As a result of these increases in internet and technology access, the term "digital divide" has seen a drop in interest and attention from 2010 to 2020 (See Figure 1).

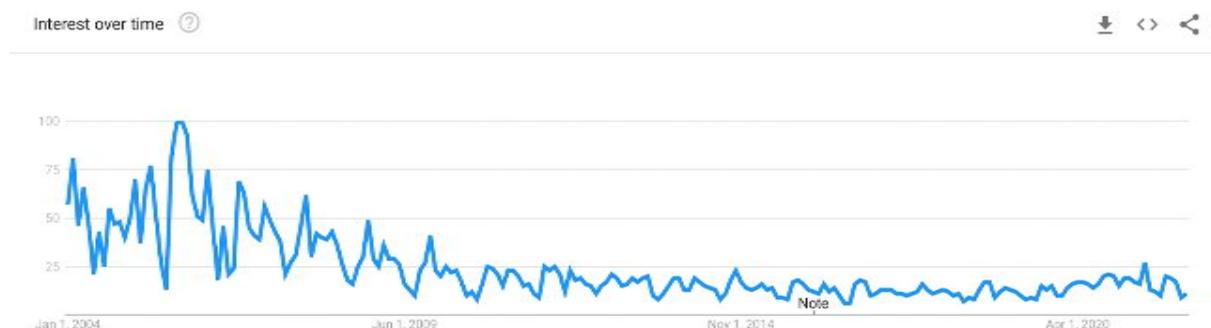


Figure 1 ("A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term.") (Google Trends)

However, although the term was initially mainly regarded as lack of physical access and ownership of computers, the OECD Secretariat claimed that "there is no single, clearly defined divide, but rather a series of gaps, brought about by a variety of factors, which often come together, many of which do not have their roots in technology" (Sparks, 2014). Therefore, despite the high internet and computer adoption rates, the digital divide still hasn't been solved thoroughly because of factors such as the differences between the quality of the internet, digital literacy, and online usage (Cruz-Jesus et al., 2016). The COVID-19's emergence, new social guidelines redefining everyday living, and making everyone heavily rely on the internet for work, school, healthcare, finance, and socialization was proof that the digital gap still exists in today's highly technological society. Although nearly 90% of respondents to a Pew Research Center survey cited the internet as important and 53% of them mentioned it as essential during the COVID-19 outbreak, learning gaps between students, differences in employment schemes, and exclusion from reliable health information and treatment occurred between those with affordable and reliable internet connections and those without, as 40% of the global population are still not active internet users in 2021 (Statista, 2021; Vogels et al., 2021). Even those who had access still had persistent problems regarding connection: the internet speeds were reduced worldwide during COVID-19, so connections with lower bandwidth aren't able to satisfy the multitasking needs of households (Lai & Widmar, 2020). In fact, internet speeds less than 25 Mbps "can only support one or two devices simultaneously and households with multiple users would require over 50 Mbps to stream high-quality content," but "15 million

U.S. citizens still were below this benchmark when COVID-19 started" and only "51.6% of rural U.S. residents had 25/25 megabits per second (Mbps) internet access in 2018 compared to 94% urban residents" (Lai & Widmar, 2020). At times when the internet is more essential than ever, the penetration rates for broadband (high-speed internet connection) still not being close to the optimal limits of what users can do with the availability of the devices (Verizon; Ayanso et al., 2020). Thus, the digital divide is still among the crucial problems of the 21st-century.

The socioeconomic implications of the digital divide have been present in many areas of life. Still, education, work, healthcare, and economic growth are particularly affected by the gap between those who have access to technological devices and reliable and fast internet connections and those who don't, especially during the pandemic. This research examines the impact of the digital divide on these areas. A literature review is conducted, and based on the findings, the direction of the future of the digital divide and suggestions for future researchers, governments, and firms regarding digitalization campaigns and initiatives to promote digital inclusion on a global scale are given.

Education

Before the majority of schools switched to online learning due to the COVID-19 pandemic, the digital divide in education included schools' utilization of technological devices in teaching. While more affluent schools have provided the opportunity to integrate modern technology in their regular curriculum, poorer schools only use these technologies when only necessary, if they used them at all. Students of richer schools, for instance, are taught to conduct online

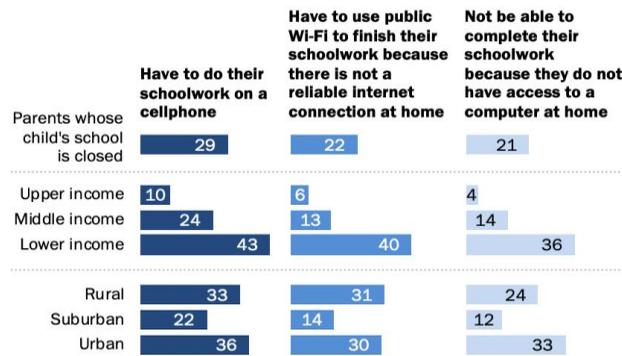
research, statistical analyses, and video creation and editing. In fact, at some schools, every student is provided a MacBook and encouraged to learn basic skills that would be required in employment like Excel, Word, PowerPoint, iMovie, etc., in IT classes. However, schools on the other end of the spectrum mostly use technology to share slides of the existing material. It is not only the availability of the devices at schools, however. In developing countries that are slowly shifting their curriculum to a more digital one, teachers lack the skills to utilize technology efficiently. A survey by Samsung Electronics Africa demonstrated that 60% of teachers in Africa "feel they are ill-prepared to use and teach about technology to their students" (Steele, 2019).

After COVID-19, when nearly 95% of schools have been closed due to the outbreak, schools had to manage technology to keep educating their students. Ones that didn't use an online submission and announcement programs like Google Classroom or Blackboard searched for ways to integrate them into their education system and teach the programs to teachers who haven't used them previously. Still, the issue wasn't one-sided: students were required to access reliable internet connection and devices that supported the tools schools used for e-learning. However, as was the case before the pandemic, mainly due to the existent contrasts between income levels of households, students from less-affluent families struggled more in the transition from face-to-face to online learning. According to a Pew Research Center survey, "Overall, roughly one-in-five parents with homebound school children say it is very or somewhat likely their children will not be able to complete their schoolwork because they do not have access to a computer at home (21%)

or have to use public Wi-Fi to finish their schoolwork because there is not a reliable internet connection at home (22%). And about three-in-ten parents (29%) report that it is at least somewhat likely their children will have to do their schoolwork on a cellphone." (Vogels et al., 2021). These issues were even frequent for those with lower incomes: The same survey by Pew found that "some 43% of lower-income parents with children whose schools shut down say it is very or somewhat likely their children will have to do schoolwork on their cellphones; 40% report the same likelihood of their child having to use public Wi-Fi to finish schoolwork because there is not a reliable internet connection at home, and about one-third (36%) say it is at least somewhat likely their children will not be able to complete schoolwork because they do not have access to a computer at home. At the same time, rural and urban parents whose children's schools have closed are more likely than their suburban counterparts to think that it is at least somewhat likely their children will struggle with their schoolwork because of a lack of digital resources at home" (Vogels et al., 2021) (See Figure 2).

Many parents with lower incomes say it's likely their child will face digital obstacles when trying to do schoolwork at home during outbreak

Among parents with children whose schools are closed, % who say it is very or somewhat likely that as their children do their schoolwork at home during the coronavirus outbreak, they will ...



Note: Only parents of elementary, middle and high school students whose school is currently closed were asked this question. Family income tiers are based on adjusted 2018 earnings. Those who did not give an answer or who gave other responses are not shown.

Source: Survey of U.S. adults conducted April 7-12, 2020.

"53% of Americans Say the Internet Has Been Essential During the COVID-19 Outbreak"

PEW RESEARCH CENTER

Figure 2 (Vogels et al., 2021)

Besides schoolwork, ICTs help students in learning new topics and skills. Today, platforms like Udemy, Coursera, and edX offer free online courses that provide students with enormous opportunities to enhance their skill set and learn what is of interest to them. Reddit, YouTube, and Netflix, although most see them as sources of entertainment, are home for knowledge with documentaries, written content, and other types of educational information. Likewise, Khan Academy is a completely free online platform that assists students' learning process throughout the school years. What's more, college applications are conducted entirely online, so students who don't have access to ICTs are precluded from extensive opportunities to be active and productive participants of the digital society. To prevent this, bridge the digital divide in education, and foster access to education to all students in this digital ecosystem, nationwide projects are necessary. For instance, One Laptop Per

Child aims to fund every public school to reduce the lack of access to education with laptops and the Federal Communications Commission's (FCC) E-Rate helps schools to afford broadband connections (Steele, 2019). During the pandemic, "some school districts have also placed school buses on rotating schedules to provide temporary Wi-Fi hotspots" and "internet access has also been made publicly available to families with students in other places such as libraries, fire departments" (Lai & Widmar, 2020). However, the location of these buses or public spaces could present problems for households that live in more rural areas, where the digital divide is explicitly more common (Riddlesden & Singleton, 2014). Therefore, instead of temporary solutions like providing common areas, initiatives that aim to permanently solve this issue by providing broadband infrastructure and newer devices could effectively bridge the digital divide in education.

Employment

In the digital economy of today, businesses understand that they'll be wiped out by their technology-utilizing counterparts if they don't have a digital presence (Zadravec-Powell, 2017). Especially during COVID-19, this need showed its importance. As a simple example, restaurants that weren't on food-delivery apps witnessed a considerable decrease in their orders. In contrast, the ones that efficiently used these platforms and escalated their digital presence through digital marketing campaigns could stay in business even in the most extraordinary times. Besides company perspectives, though, the benefits of utilizing ICTs are especially notable for individuals seeking jobs (Chetty et al., 2018). As most companies seek to build a robust digital presence and build newer business models centered around digitalization, they mainly search for employees with strong digital literacy. In fact, "according to the U.S Department of labor, 77% of all U.S. jobs will require an individual to have computer skills by 2020" and "baseline digital skills alone pay a 17 percent premium over non-digital roles" (Steele, 2019; Mracek, 2018). Additionally, the job search has also gone online. LinkedIn, for instance, is now one of the most preferred business networking and job search platforms, both for employees and employers. Hence, ICTs could have remarkable benefits in the employment sector.

Healthcare

Access to technology became an essential aspect of healthcare as more people have relied on telemedicine during the pandemic, and having the required skills and devices is now among the factors that determine health. In the past years, online patient portals have

become crucial for chronic disease management, calculating risk for particular diseases, and medicine and allergy tracking. After COVID-19, vaccine tracking, as well as getting reliable information about the virus were added to the prevalent use cases of these patient portals. Since information on COVID-19 could often be framed in hard-to-understand medical language, ones who couldn't efficiently use technology due to financial reasons or digital illiteracy couldn't efficiently make use of the reliable sources on the internet to obtain information about the virus, resulting in them deviating from the official safety guidelines to prevent the spread of the disease. What's more, in some countries, registration for COVID-19 vaccination is only made from online platforms, so ones who don't have access or don't know how to register by themselves have to call hospitals to get their registrations done, a lengthy and unconventional process that some might not want to put themselves in. This could result in more not getting the vaccine and thus creating a barrier to again limit the spread of the disease. Promoting digital literacy and internet and device access in order to mitigate the harms of the digital divide in healthcare could include hospitals partnering with community organizations to develop "education and skills-building programs," "government subsidies for broadband subscribership and data charge subsidies for mobile health applications" that helps reduce cost barriers, and more (Eruchalu et al., 2021).

Economic Growth

The utilization of ICTs has been noted for its major contribution to nations' overall economic development. From a supply-side perspective, they are effective in raising labor productivity and innovation, creating new

business models and supply chain management, and allowing for greater access to input and output markets, creating spillover benefits in management models in many industries (Kouadri & Cherif, 2020). On the other hand, the usage of ICTs initiates a reduction in the transactional costs of customers on the demand side (Kouadri & Cherif, 2020). Furthermore, telecommunications and internet connection support the infrastructure of the digital economy such as digital marketing and online shopping (Steele, 2019). On a macro scale, a study by Deloitte revealed that "a 10 percentage-point increase of broadband penetration in 2016 would have resulted in more than 806,000 additional jobs in 2019, or an average annual increase of 269,000 jobs," "a 10 percentage-point increase in broadband access in 2014, would have resulted in more than 875,000 additional U.S. jobs and \$186 billion more in economic output in 2019," and "adding 10 Mbps to average download speeds in 2016 would have resulted in 139,400 additional jobs in 2019 or about 46,500 additional jobs per year" (Deloitte, 2021). Another study demonstrates that the mobile technology and service industry made up for 5% of national GDPs amount for \$191 billion and supported the creation of 1 million jobs in developing countries (Kouadri & Cherif, 2020). Thus, it can be concluded that societies who fail to integrate ICTs in their economy will fall short of significant growth potentials, as increased broadband penetration, availability, and speed all lead to noteworthy increases in economic growth, human development, and wealth creation (Kouadri & Cherif, 2020).

Suggestions & Further Research

Research on the digital divide was significantly larger during the time period from 1990 to 2010, but as demonstrated, it has

reasonably fallen out of the literature due to the development of technology and greater internet access. However, COVID-19's emergence forced students, employees, and patients to go online to continue their activities and proved that the digital divide still exists in our highly technological ecosystem. It's no doubt that ICTs are now intertwined with daily lives and are especially important in healthcare, education, employment, and economic growth. Therefore, it is highly recommended for future researchers to examine the impacts of the digital divide during and after COVID-19 in order to guide policymakers through digitalization policies.

Conclusion

Although internet access and computer usage rates have risen, the digital divide has still manages to persist in today's constantly developing ecosystem. Today, the quality of internet connection and digital illiteracy define the digital divide more than solely lack of physical access. Its impacts, especially during the pandemic, have been observed mainly in the areas of education, employment, healthcare, and economic growth, as students who couldn't satisfy reliable and fast internet connections were cut short of their curriculum, employees who lacked the required computer program and software skills were laid off, patients who couldn't access online patient portals struggled more in getting reliable information on COVID-19 and registering for vaccination, and countries whose investment in ICT infrastructure were below the optimal saw inefficiencies in the workforce, innovation, and job-creation, ultimately resulting in slowly developing societies. As ICTs and digital literacy become so important for every citizen, largely in transition to the

digital economy, the question of whether reliable and fast internet connections should be public goods instead of private goods arises. Still, as this question will eventually find an answer, a "call to action" is required for getting every member of this global digital society to be active contributors.

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