Examining the Digital Divide in Education during COVID-19 from Teachers’ Perspectives

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Examining the Digital Divide in Education during COVID-19 from Teachers’ Perspectives

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The outbreak of COVID-19 resulted in unprecedented school closures in education, leading online education to become “the new normal.” Concurrently, emergency online instruction further exacerbated what is known as the digital divide, one of the contributing factors to inequality of educational opportunities. The purpose of our research is to examine in what ways the digital divide influences teachers and students during COVID-19. A better understanding of teachers’ perceptions of teaching online and the digital divide can offer more information for effective teaching during the pandemic. In this multi-method study, researchers collected data from 36 teachers through Likert scale questions and open-ended survey questions. The findings indicated that first- and second-level digital divides are the main problems affecting online education during the COVID-19 outbreak. Some students might not benefit from online learning due to the digital divide. Lack of access to technology and the internet, first-level digital divide, affected primarily students from lower SES. Further, even though some students had access to technology and the internet, students’ and teachers’ information and communication technology (ICT) skills, second-level digital divide, impacted how they use technology and profit from online education. Teachers need support to improve their own ICT skills, as well as their students, to reduce the impact of the digital divide in education.

**Keywords:** covid-19; inequality; online education; first-level digital divide; second-level digital divide

**Introduction**

According to UNESCO 2023 statistics, the Coronavirus (COVID-19) pandemic affected approximately 58 million students, and school closures happened for at least 41 weeks in the U.S. until February 2022 (UNESCO, 2020a). Due to the increased number of COVID-19 related cases and deaths in the U.S. and many other countries, nearly every public and private school was closed to provide social distancing that medical experts proposed as an effective way to slow the spread of the virus, while a vaccine was being developed (Kennedy, 2020). Online education and hybrid reopening plans were implemented as an alternative method to traditional education across the world (UNESCO, 2020a). Online education, with several terms such as open learning, blended learning, and m-learning, allows students with an internet connection to learn anywhere and anytime (Cojocariu et al., 2014). During the lockdown, international organizations imparted information about digital resources to help teachers, schools, and parents facilitate student learning online (Reimers et al., 2020; UNESCO, 2020b).
However, there were concerns over inequalities in education due to the varying level of access to online learning available to students from different socio-economic statuses (SES) backgrounds. Students from lower SES backgrounds had less opportunity to gain access to online classes, individualized resources (including private tutoring or chats with teachers), and educational activities compared to their counterparts from higher SES backgrounds (Andrew et al., 2020). Further, the lack of technology access was reported as a real challenge of learning from home for students from disadvantaged groups in society (Bol, 2020; Herold, 2020), which is about the digital divide. The distributional consequences of digital inequality have been examined on different levels (Attewell, 2001; Gorski, 2005; Van Deursen et al., 2017). First-level digital divide refers to the gap in the accessibility to technology and the Internet across demographic subgroups (Judge et al., 2006; Purcell et al., 2013). Second-level digital divide pertains to the distinction in information and communication (ICT) skills (Attewell, 2001; Hargittai, 2002; Norris, 2001; Van Dijk, 2005). Finally, third-level digital divide is the difference in beneficial outcomes of using digital devices and the internet (Van Deursen & Helsper, 2015; Wei et al., 2011). The current study focused on how the first- and second-level digital divide influenced teachers and students during COVID-19.

**Literature Review and Theoretical Framework**

**Bourdieu’s Forms of Capital**

French sociologist Pierre Bourdieu broadened the understanding of social class by introducing the concept of capital as economic, cultural, and social (Bourdieu, 1973, 1980). Economic capital is manifested via money and objects, which can be directly converted to economic gain. Cultural capital includes people's tangible and intangible assets, such as skills and educational qualifications; cultural capital also includes the experience, skills, and understanding to navigate capital. In contrast, social capital is the social network that might help people obtain profit and assets (Bourdieu, 1973, 1980). These forms of capital intersect with one another and expand the impact of capital. For instance, with economic capital alone, students might not be successful in a school. However, economic capital can be used for private courses and extra books. Thus, the students convert economic capital to cultural capital (Levinson, 2011). Social capital might also help people find satisfactory jobs; thereby, they can convert their social capital into economic capital.

At the same time, Bourdieu (1973, 1980) expressed that social stratification is impacted by not only economic capital but also cultural and social capital, which influences students during their education. For example, research has found that social class inequality affects students' performance (Bernardi & Cebolla, 2014; Meraviglia & Buis, 2015), choices related to their education (Sianou-Kyrgiou & Tsiplakides, 2011), and drop-out rates (Cemalcilar & Goksen, 2012; Soria & Bultmann, 2014).

Digital divide is one of the issues of inequality during the pandemic. Accessibility to technology and the internet relates to students' economic capital. Besides, students' and teachers' ICT skills and use of technology denote their cultural capital. However, socioeconomic status has influenced students' accessibility to equal educational opportunities in the COVID-19 era (Andrew et al., 2020; Bol, 2020; Jæger & Blaabæk, 2020). Students without these forms of capital may not benefit from online or remote learning, which may perpetuate social class inequality in education during COVID-19.
Digital Divide

The digital divide is defined as the distinction between groups or individuals with access to ICT and those without access. The most well-known conception of first-level digital divide is unequal access to digital devices and the internet at home and school (Attewell, 2001; DiMaggio & Hargittai, 2001; Warschauer, 2003). While some students from underprivileged groups do not have access to technology and the internet, others in privileged groups have access to these in their homes and schools. Due to this unequal situation, students without access to technology cannot reap the benefits of using technology and cannot participate fully in a modern economy (Attewell, 2001).

Several inequalities, such as socioeconomic background, race, and gender, were reported as determinants of the digital divide (Van Dijk, 2013). Socio-economic status has been identified as the most crucial factor affecting first-level digital gap (Hess & Leal, 2001; Judge et al., 2004; Kim & Bagaka, 2005). Hohlfeld et al. (2017) illustrated that there were not any differences between schools from high-SES and low-SES in terms of first-level digital divide in the U.S. All schools' technological resources from 2008 to 2015 increased, and these schools had modern technologies.

Although the first descriptions of the digital divide focused on the accessibility to technology in education, researchers have expanded the digital divide's depiction over time. Digital skills refer to abilities to learn, use, and manage digital hardware, software, and internet connections (Soomro et al., 2018). In the literature, researchers defined the lack of these abilities to use ICT as second-level digital divide (Attewell, 2001; Hargittai, 2002; Norris, 2001). In addition to access to technology, students need to develop digital skills to use technology. Students' ICT knowledge and skills based on socioeconomic status (SES) of the school, education level of the area, gender, or race differed (Hargittai, 2010; Ritzhaupt et al., 2013; Simoni et al., 2016). Students with the availability of technology and the Internet at home have better skills than students who do not (Zhao et al., 2010; Zhong, 2011).

Socio-economic status was also found to be a determinant of second-level digital divide. Students in urban and rural schools used technology for word processing, interactive activities (Web searching, computer games, and email), and productive tools (PowerPoint and spreadsheet) less than students in suburban schools (Kim & Bagaka, 2005). Ritzhaupt et al. (2013) compared 5,990 middle school students' ICT knowledge based on their gender, ethnicity, and SES within 13 districts in Florida. The findings are consistent with previous studies that students' SES significantly influences their proficiency in ICT: lower SES students indicated lower ICT skills than others. Simoni et al. (2016) found that the median income of the demographic area, the area's education level, and the number of racial groups in the area impacted the students' computer use.

Conversely, previous studies indicated that teachers used technology for different purposes across schools of different SES (Graves & Bowers, 2018; Hohlfeld et al., 2017; Reinhart et al., 2011). For example, teachers in lower SES school districts used technology for administrative purposes, such as grading or lesson plans and creating and communicating among students and parents. Teachers from high-SES schools used technology for instructional purposes more than teachers from low-SES schools.
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(Hohlfeld et al., 2017). Moreover, teachers in schools with many students from low SES backgrounds offer basic instructional support and guidance for students to use technology, while others in high SES schools use technology to promote higher-order thinking skills (Reinhart et al., 2011). Therefore, these differences in teachers’ use of technology influence students’ use of technology.

Under normal circumstances, technology integration can be a powerful way to shrink long-standing digital divide types and adapt learning experiences to meet all learners’ needs at school (U.S. Department of Education, Office of Educational Technology, 2017). Schools and teachers might be the key components of technology integration and reducing the digital divide. However, because of the COVID-19 outbreak, many schools were closed, and students from disadvantaged families have faced different digital divide levels, likely increasing the already-existing gap among students in education. The gap in access to computers and the internet also led to a gap in how students used technology and developed their technological skills and literacy.

The Impact of COVID-19 on Education

The COVID-19 pandemic caused a sudden shift to remote learning. Although research on the educational impacts of COVID-19 is still emerging, many studies have shown the widespread effect of COVID-19 on education. During the COVID-19 pandemic, remote education influenced students’ academic achievement and academic-related experiences and behaviors, such as school engagement and motivation, which can indirectly impact achievement (Golden et al., 2023). For example, students' performance was tested lower in the UK compared to previous years (Engzell et al., 2021), while Dorn et al. (2020) reported learning loss due to slower progress in remote education and the quality of teaching during the pandemic. Meanwhile, An et al. (2021) and Leech et al. (2022) found a lack of student participation, engagement, and well-being was reported as challenges in remote education during the pandemic.

Besides, even though some studies did not use digital divide to describe it, they stated that the lack of students’ computer and internet access were challenges affecting remote education in the world. For instance, Azubuike et al. (2021) found that students from private and public schools in Nigeria had different remote learning opportunities due to their access to digital devices, internet, and electricity. Similarly, Mathrani et al. (2022) found a difference in accessing technology and the internet between male and female students, in which female students had less access to technology for online learning. In the United States, Francis and Weller (2022) found that Black and Hispanic/Latinx households had less reliable internet and technologies, which impacted students' benefits from remote education.

A number of studies (see: Andrew et al., 2020; Bol, 2020; Francom et al., 2021; Gross & Opalka, 2020; Sintema, 2020) also have examined the effect of COVID-19 on inequalities in education, they have overlooked the problem from the digital divide perspective and did not focus second-level digital divide. This study aims to discover teachers' perceptions of the first- and second-level digital divide (RQ1 and RQ2), referring to accessing technology resources and digital skills to use technology effectively, respectively, and online teaching (RQ3) during COVID-19. The study also explores teachers' perceptions of school roles in digital divide during the pandemic.
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(RQ1). A better understanding of teachers' perceptions of digital divide and online teaching can offer more information for effective teaching post-pandemic.

Moreover, this study's findings might shed light on the problem influencing online education's effectiveness and the importance of bridging the digital divide. The following research questions guided this study to examine the research purpose:

1. What are teachers’ perceptions of ICT in school resources, including software, hardware, and internet, and support and schools' role in digital divide?
2. What are the teachers’ perceptions of the first and second-level digital divide during COVID-19?
3. What are teachers’ online teaching experiences during COVID-19?

Methodology

This study implemented a multi-method study design to understand K-12 teachers’ perceptions about digital divide and online teaching during the pandemic. The multi-method approach allows researchers to use different types of qualitative or quantitative data (Creswell & Plano Clark, 2007). Considering the exploratory nature of the research questions and the recency of the COVID-19 pandemic, this study was designed with descriptive survey data and open-ended questionnaire data used in combination.

Sampling and Participants

The sampling frame came from the Center of Clinical Practice in Education at a Midwestern University in the United States. The sampling frame included approximately 1100 K-12 teachers from twenty-five different districts in Southeast Ohio. The teachers were from different grade levels—elementary, middle, and high school—and subject types—English language arts, Spanish, or other languages, STEM (Science, Technology, Engineering, Mathematics), and social studies. Each teacher was assigned a number in the sampling frame, and 150 teachers were selected randomly using a randomizer software (http://www.randomizer.org).

Out of 150 teachers, 38 filled out the survey with a response rate of 25.33%. Two participants were removed because 90% of the responses were empty.

Table 1
Summary of the Distribution of Teachers’ Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language Arts, Spanish, or other foreign languages</td>
<td>16</td>
<td>44.4</td>
</tr>
<tr>
<td>All Subjects</td>
<td>8</td>
<td>22.2</td>
</tr>
<tr>
<td>STEM (Science, Technology, Engineering and Math)</td>
<td>4</td>
<td>11.1</td>
</tr>
<tr>
<td>Social Studies (e.g., History, Geography, Civics, Law, Economics)</td>
<td>2</td>
<td>5.6</td>
</tr>
<tr>
<td>Physical Education</td>
<td>2</td>
<td>5.6</td>
</tr>
<tr>
<td>N/A</td>
<td>4</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Our final sample included thirty-six K-12 teachers. Teachers' ages were between 24 and 65. The average age of teachers was 46, although eight teachers did not provide their age on the survey. The average teaching experience was 18 years (ranging from 1 to 34
years) based on the responses received from participants; it should be noted that seven participants did not provide information on their teaching experience. Many of the teachers held a graduate degree (69%), while four had a bachelor's degree, and seven teachers did not respond to this question. Many teachers were teaching English Language Arts, Spanish, or other foreign languages. Table 1 presents the distribution of teachers’ subjects, frequencies, and percentages.

Most of the teachers were teaching at elementary schools (33.3%) or high schools (30.6%). Table 2 presents the distribution of school levels among teachers. Most of these schools were from lower SES. The average free and reduced lunch percentage for these schools was 58% (ranging from 28% to 80%).

Table 2
Summary of the Distribution of School Levels among Teachers

<table>
<thead>
<tr>
<th>School Level</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary School</td>
<td>12</td>
<td>33.3</td>
</tr>
<tr>
<td>Middle School</td>
<td>8</td>
<td>22.2</td>
</tr>
<tr>
<td>High School</td>
<td>11</td>
<td>30.6</td>
</tr>
<tr>
<td>Multiple School Levels</td>
<td>2</td>
<td>5.6</td>
</tr>
<tr>
<td>N/A</td>
<td>3</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Although the response rate of the online survey was low, it is important to note that the sample was randomly selected, which minimized the selection bias. On the other hand, the aim of our qualitative exploratory case study is not generalizability. The sample in qualitative studies should capture different aspects of the research phenomena (Kuper et al., 2008). Our sample included teachers from different school levels, such as elementary, middle, and high schools, as well as from different content areas, ages, and years of experience. Therefore, we can conclude that the sample is adequate to answer the research questions.

Instrument

The researchers used an online multi-method descriptive survey to collect data. The survey instrument consisted of three sections: demographic items, schools’ resources, support scale items, and open-ended questions. The first section included demographic information: age, teachers’ highest degree, grade level(s) taught, subjects taught, school name, and years of experience teaching. The demographic items provided descriptive information about teachers.

Although teachers did not indicate school SES, we used school names to determine the school’s SES. We selected the percentage of students getting free/reduced lunch in schools as an indicator of school SES, and we extracted that information from the Ohio Department of Education. Thus, school SES was added as a variable in our dataset.

ICT schools’ resources and support scale included eight questions that were developed to evaluate teachers’ perceptions of ICT in schools for the IEA International Computer and Information Literacy Study 2018 (Fraillon et al., 2019). This scale aims to collect information about school resources and support available for teachers to integrate
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technology into their classrooms. A Likert scale was used with values ranging from 1, indicating Strongly Disagree, to 4, indicating Strongly Agree. Cronbach’s alpha of the scale was .84, and this value was above the acceptable reliability measure of .7 (Nunnally, 1978).

Open-ended questions aimed to explore teachers’ perception of digital divide and online teaching during COVID-19. The open-ended questions were about first-level digital divide, second-level digital divide, school role regarding the digital divide, and online teaching options during the COVID-19 pandemic as Twining et al. (2017) suggested; the open-ended questions were given in the appendix.

Data Collection

An online survey was sent through Qualtrics to the teachers’ email addresses. The survey window was open for two months, from March 25, 2020, to May 25, 2020. Participation in this study was voluntary, and participants signed an online consent form before taking the survey. IRB approval was received from Ohio University.

Our research includes multi-method descriptive survey data to answer our research questions, and the majority of our data is qualitative data from open-ended questionnaire items (Johnson & Christensen, 2017). In addition to open-ended questions, the survey included demographic information questions, and Likert type questions. These questions were used to describe the sample and school ICT support and resources.

Data Analysis

Frequency counts and percentages were used to analyze demographic items, and descriptive statistics were used to analyze the Likert scale questions to answer RQ1. We reported mean and standard deviation to describe the teachers’ perceptions of ICT in schools’ resources and support. For RQ2 and RQ3, open-ended questions were examined using content analysis. Content analysis categories qualitative data based on similarities and differences to find concepts and patterns in the data (Glesne, 2015). Two researchers read and coded qualitative data independently based on content analysis. Then, they compared quotes, codes, and concepts, and any disagreements were resolved through discussion. In the results tables, the frequency and percentage of each code was provided. The percentages of codes were computed based on the total number of participants. Example quotes for each code were included for a more precise interpretation.

Results

School Role Regarding Digital Divide

Table 3 summarizes teachers’ perceptions of ICT related school resources and support where the mean and standard deviation of the items were presented.

Resources and support variables were created as the mean of four items for each variable. Overall, teachers rated school ICT support lower than school ICT resources. The question, educational technologies are considered a priority for use in teaching at
my school, had the highest mean (M=3.19, SD=0.71), which indicated the use of educational technology is a priority for teaching. However, the item, *there is sufficient opportunity for me to develop expertise in educational technologies*, had the lowest mean (M=2.33, SD=0.89) as teachers claimed they needed more support regarding educational technology.

Table 3

*Summary of Teachers’ Perceptions of ICT in Schools’ Resources and Support Scale*

<table>
<thead>
<tr>
<th>Items</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1. My school has sufficient educational technologies (e.g., computers).</td>
<td>36</td>
<td>2.94</td>
<td>0.92</td>
</tr>
<tr>
<td>RQ2. The computer equipment in my school is up-to-date.</td>
<td>36</td>
<td>3.06</td>
<td>0.83</td>
</tr>
<tr>
<td>RQ3. My school has access to sufficient educational learning resources (e.g., learning software or apps)</td>
<td>36</td>
<td>2.97</td>
<td>0.88</td>
</tr>
<tr>
<td>RQ4. My school has good connectivity (e.g., fast speed and stable) to the Internet.</td>
<td>36</td>
<td>2.86</td>
<td>0.99</td>
</tr>
<tr>
<td>Resources</td>
<td>36</td>
<td>2.96</td>
<td>0.77</td>
</tr>
<tr>
<td>SQ1. Educational technologies are considered a priority for use in teaching at my school</td>
<td>36</td>
<td>3.19</td>
<td>0.71</td>
</tr>
<tr>
<td>SQ2. There is enough time to prepare lessons that incorporate educational technologies.</td>
<td>36</td>
<td>2.64</td>
<td>0.90</td>
</tr>
<tr>
<td>SQ3. There is sufficient opportunity for me to develop expertise in educational technologies.</td>
<td>36</td>
<td>2.33</td>
<td>0.89</td>
</tr>
<tr>
<td>SQ4. There is sufficient technical support to maintain educational technology resources.</td>
<td>36</td>
<td>2.78</td>
<td>0.96</td>
</tr>
<tr>
<td>Support</td>
<td>36</td>
<td>2.74</td>
<td>0.61</td>
</tr>
</tbody>
</table>

*Note. RQ: School Resources Questions; SQ: School Support Questions*

At the end of the survey, educators were asked to share their perceptions about schools’ roles in the digital divide. The frequency and percentage of occurrences of each code were presented in Table 4 along with example quotes.

Four different codes resulted from the open-ended survey item data analysis: teaching students about technology skills, providing students with technology devices and the internet, supporting teachers regarding educational technology, and others.

Many teachers (39%) indicated that the schools’ role is teaching students technology skills. One teacher said “I believe that the role of schools is to prepare students for the world in which they will work and live. Today, that means preparing them for a world in the digital age.”

About 20% of teachers suggested that schools should provide students with technological devices and the internet, and an exemplary quote said, "The Corona Virus has proven that high-speed internet is a necessary component of modern public
education and should be funded by the state for each student.” In addition, teachers
need support with educational technology. At the same time, a teacher stated that “not
every teacher is comfortable with technology, and school districts have limited means to
provide meaningful, differentiated technological professional development to assist
teachers in integrating technology into their teaching.” These results, based on teachers’
perceptions, suggested that schools carry a significant responsibility towards bridging
the digital divide.

Table 4
Summary of Codes for Teachers’ Perceptions Schools’ Role regarding Digital Divide

<table>
<thead>
<tr>
<th>Codes</th>
<th>Freq</th>
<th>%</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching students about</td>
<td>14</td>
<td>39</td>
<td>Schools need to provide as many educational opportunities as possible.</td>
</tr>
<tr>
<td>technology skills</td>
<td></td>
<td></td>
<td>I believe that the role of schools is to prepare students for the world in which they will work and live. Today that means preparing them for a world in the digital age.</td>
</tr>
<tr>
<td>Providing students technology</td>
<td>7</td>
<td>19</td>
<td>I believe schools should provide adequate technology/software, etc. while at school with reliable internet service. The district should also provide if needed laptops and digital access for students that to not have their own laptops and also do not have internet access at home. The Corona Virus has proven that high speed internet is a necessary component of modern public education and should be funded by the state for each student.</td>
</tr>
<tr>
<td>devices and the internet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting teachers</td>
<td>4</td>
<td>11</td>
<td>Further, not every teacher is comfortable with technology, and school districts have limited means to provide meaningful, differentiated technological professional development to assist teachers in integrating technology into their teaching. Schools need to continue researching and training teachers so that we can become more proficient. The students who have access to computers or tablets, and use them regularly, are much more accomplished on them than the teachers. We do not receive the training on these devices.</td>
</tr>
<tr>
<td>regarding educational</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>8</td>
<td>While employing security to ensure student safety and monitor what students are actually doing online. However, funding is an issue for the poorer school districts, like mine. This is the real hurdle.</td>
</tr>
</tbody>
</table>

First- and Second-Level Digital Divide
Further questions asked about teacher experience with the first- and second-level digital divide. The frequency and percentage of occurrences of each code regarding first-level digital divide were presented in Table 5 along with example quotes.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Freq</th>
<th>%</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-level digital divide is evident at home and school districts</td>
<td>13</td>
<td>36</td>
<td>We are not able to remotely teach because of the lack of access to technology and internet. I teach in a very rural, economically challenged district with limited internet and cell phone service. Most people outside of this area, including many educational technological resources, are completely ignorant of this situation.</td>
</tr>
<tr>
<td>With COVID-19, first-level digital divide become more apparent.</td>
<td>6</td>
<td>17</td>
<td>It is becoming even more apparent in the current situation of at home learning. Based on this information, and the COVID-19 shutdown, it is very clear who can and cannot access material via the internet.</td>
</tr>
<tr>
<td>First-level digital divide is closing</td>
<td>4</td>
<td>11</td>
<td>I few that the First level is not as extreme as it was in the 2000's. As with all electronics the longer it is on the market the cheaper devices become. In my area, every student has some sort of device that is capable of online cruising. The difference is more towards name brand. Many school systems these days are providing students with internet to use at home, and most students have Chrome Books to use at school and at home. I believe that the digital divide is closing.</td>
</tr>
</tbody>
</table>

Reasons for Digital Divide

| Insufficient digital devices for online learning | 5 | 14 | While on this extended break, some of my students have internet and tablets, some have internet and only a parent phone and some have nothing. It’s hard to meet their needs. Some of my students do not have their own computers, etc. they must share with the whole family which limits the time or data they can access. |
Parents do not value access to materials. I have also experienced students who have less/no technology access because they live with grandparents/ an older generation who do not see the need to or does not understand how to use technology.

Second-level digital divide is about students’ ability to use educational technology, including digital devices and software. Two codes were generated on second-level digital divide (Table 6).

Table 6
Summary of Codes for Teachers’ Experiences regarding Second-Level Digital Divide

<table>
<thead>
<tr>
<th>Codes</th>
<th>Freq</th>
<th>%</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second-level digital divide is observed</td>
<td>9</td>
<td>25</td>
<td>However, I find that most students have very poor typing skills, which leads to frustration when using the simpler technologies, such as Google Docs, Google Forms, and Google Sheets. Some students, while home, still have trouble just logging on to the computer. They did it here at school but somehow forgot once they went home.? As I am designing lessons for the next few weeks, I am having trouble knowing the most simple way to educate not knowing the abilities of my students to pick up this new way of learning by remote.</td>
</tr>
<tr>
<td>Due to first-level digital divide, students could not gain technological skills</td>
<td>7</td>
<td>20</td>
<td>Sure. If students don't have the technology available to them, they can't learn how to use it. However, there is a huge disparity in the classroom in software usage and devices because of the lack of those things in the classroom.</td>
</tr>
</tbody>
</table>

Teachers stated that second-level digital divide is observed among students. For instance, one teacher said, “I find that most students have very poor typing skills, which lead to frustration when using simpler technologies, such as Google Docs, Google Forms, and Google Sheets.” On the other hand, teachers pointed out that due to first-level digital divide, students could not gain technological skills. For example, one said “if students don't have the technology available to them, they can't learn how to use it.”

**Teacher Online Teaching Experiences during COVID-19**

Table 7 summarizes the teachers’ online teaching experiences during COVID-19, including the frequency and percentage of code occurrences and exemplary quotes.

Table 7
Summary of Codes for Teacher Online Teaching Experiences
<table>
<thead>
<tr>
<th>Codes</th>
<th>Freq</th>
<th>%</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Perception of Online Teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative attitude toward online teaching</td>
<td>10</td>
<td>28</td>
<td>I hate it. I miss my students so much. I miss being able to read their faces to check for understanding. I miss assisting them in their learning. I hate when a student emails me that they are confused about number 1. I want to just sit right next to them and explain it!</td>
</tr>
<tr>
<td>Online teaching tools</td>
<td>9</td>
<td>25</td>
<td>We conducted our own &quot;research&quot; about our current students and families and decided that the best platform for us would be to have a private Facebook page where we can upload video lessons and resources to share with students and families. This is the way we can reach the most students. Many student's parents may not have a computer or internet access at home, but they have a smart phone with a data plan.</td>
</tr>
<tr>
<td>Positive attitude toward online teaching</td>
<td>5</td>
<td>14</td>
<td>I enjoy online teaching, creating examples, videos, and worksheets through Google Classroom. There are so many options for learning it is hard to describe them all.</td>
</tr>
<tr>
<td>Lack of skills for online teaching</td>
<td>4</td>
<td>11</td>
<td>My co-teachers and I are doing our best to provide students with a rich learning experience. It can be beneficial, but I need a lot more training.</td>
</tr>
<tr>
<td>Distance teaching with paper packets</td>
<td>3</td>
<td>8</td>
<td>I don't think enough teachers are equipped with the necessary skills to &quot;teach&quot; this way. I think we are doing as well as we can. We have all been trained in a variety of techniques with a variety of tools, but it isn't like we have had classes, time to practice…</td>
</tr>
</tbody>
</table>
Online teaching, for our district, in particular, is nearly impossible. Even with devices, many of the families in our rural district do not have reliable internet (I do not). Therefore, any online suggestions are not mandatory. We send home paper packets for students to practice content.

Our district is sending home paper-based items for all students as well. We have kept this to suggestions and included as much "hands-on" materials as possible. We are not sending home worksheets, we aren’t a "worksheet" kind of district.

Online teaching is good for a few things but should not be used as the only kind of teaching that students receive. There are things that cannot be done online that could be done in the classroom, face to face. We are doing the best that we can with the current situation, but it is not ideal. We need to get back into the classroom with our students as soon as possible.

I realize online teaching is a tool that I can use. I use it mainly to reinforce concepts that have been introduced in class/face-to-face.

---

**Perceiving online teaching as a tool**

<table>
<thead>
<tr>
<th>Perception</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

---

**The Effect of Online Teaching on Students**

<table>
<thead>
<tr>
<th>Concern about students’ accessibility</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>20</td>
</tr>
</tbody>
</table>

We still have a percentage of students who are not able to access our online resources, which is sad.

Because of families not having access to internet, this type of teaching is not completely effective.

Online teaching has been difficult for students. They are struggling with managing their time and a schedule from home.

<table>
<thead>
<tr>
<th>Drawbacks of online learning</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

Online teaching does not provide younger students with social and peer interaction, which continues to be a cause of behavior problems and lack of relationships in young children. Social skills are not learned through technology. Children (and adults) are becoming less able to communicate socially because of the rise of technology.

<table>
<thead>
<tr>
<th>Online teaching is not appropriate for younger students</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

While the secondary school is more prepared for online learning, the elementary level is not set up for this type of teaching/learning.

I teach kindergarten. It needs to be hands-on in person.
Many teachers (28%) demonstrated a negative attitude toward online teaching as a teacher said,

I hate it. I miss my students so much. I miss being able to read their faces to check for understanding. I miss assisting them in their learning. I hate when a student emails me that they are confused about number 1, I want to just sit right next to them and explain it!

On the other hand, only 14% of teachers expressed a positive attitude towards online teaching, such as one teacher who stated, “I enjoy online teaching, creating examples, videos, and worksheets through Google Classroom. There are so many options for learning it is hard to describe them all.”

Similarly, 25% of teachers mentioned their online teaching tools. For instance, one of them articulated that as

We conducted our own "research" about our current students and families and decided that the best platform for us would be to have a private Facebook page where we can upload video lessons and resources to share with students and families. This is the way we can reach the most students. Many student's parents may not have a computer or internet access at home, but they have a smartphone with a data plan.

These results presented that there are teachers who have a negative or positive attitude toward online teaching, while they used their resources to reach out to more students. Some teachers (11%) disclosed their lack of skills for online teaching as, “It can be beneficial, but I need a lot more training.” At the same time, some of the teachers (8%) had to do distance teaching with paper packets due to unreliable internet. An exemplary quote:

Online teaching, for our district, in particular, is nearly impossible. Even with devices, many of the families in our rural district do not have reliable internet (I do not). Therefore, any online suggestions are not mandatory. We send home paper packets for students to practice content.

Some teachers (8%) perceived online teaching as a tool, with one of them noting, “I realize online teaching is a tool that I can use. I use it mainly to reinforce concepts that have been introduced in class/faceto-face.” These responses suggested that teachers need more support regarding online teaching.

Teachers were also asked about the effect of online teaching on their students. About 20% of teachers were concerned about students’ accessibility, as explained by one teacher: “We still have a percentage of students who are not able to access our online resources, which is sad.” On the other hand, some teachers (14%) mentioned the drawbacks of online learning, such as managing their time. As one teacher explained, “Online teaching has been difficult for students. They are struggling with managing their time and a schedule from home.” Lastly, a few teachers (6%) indicated that online teaching is not appropriate for younger students, with one of them declaring, “I teach kindergarten. It needs to be hands-on in person.” For these teachers, accessibility to online content remains a problem, and students need to learn about time management for online learning.
DIGITAL DIVIDE IN EDUCATION

Discussion

This paper describes the digital divide as a factor that might widen social class inequality in education. Based on Bourdieu's forms of capital, students and teachers need to have sufficient economic, cultural, and social capital to benefit from online/remote education during the pandemic. The findings of this study are derived from teachers' perspectives who are from diverse SES schools and different subjects and grades. First, the teachers addressed the question about the role of schools regarding the digital divide, which was the focus of the first research question. The findings showed that teachers believed schools are responsible for providing technology and teaching technological skills to students. However, responses made it clear that teachers also need to be supported to improve their ICT skills by schools. In this study, the survey results also indicated that even though educational technologies suffice in schools, the teachers did not have adequate support for technology integration. The issue was pointed out below that this would necessitate assisting teachers in improving their digital skills, thus affecting how students use technology.

Second, the findings of questions about first- and second-level digital divide are essential to understanding the main problem affecting online teaching. Findings indicated that COVID-19 influenced students' accessibility to technology and the internet, and first-level digital divide was observed as more obvious, which is consistent with the results of several studies (Azubuike et al., 2021; Francis & Weller, 2022; Williams et al., 2021). In addition to that, our study highlighted the digital divide at home among students. Our results specifically underscore the limited access to high-speed internet and digital devices at home. This issue supports the assertion that schools have a key role in bridging the digital divide; students have access to technology and the internet at schools even if they do not have these resources at home (U.S. Department of Education, Office of Educational Technology, 2017). Since schools went into lockdown with the COVID-19 outbreak, the schools' role in creating equal opportunities has decreased (Bol, 2020). Without having sufficient digital devices and the internet, students may not have received adequate education during the pandemic (Jæger & Blaabæk, 2020).

The other significant issue is about second-level digital divide, which has been depicted as the gap in students' and teachers' ICT skills. Having access to resources and the internet is insufficient for effective online education without digital skills. Fewer teachers answered the question about the experience of second-level digital divide compared to other questions. This could be because teachers may not be familiar with second-level digital divide. Other teachers reported that their students did not have ample digital skills, which might be due to several reasons, such as lack of access to digital devices and the internet or lack of motivation (Van Deursen & Van Dijk, 2015).

Previous research noted that teachers' computer skills, attitude about using technology and the internet (Wood & Howley, 2012), and how to use technology (Graves & Bowers, 2018; Hohlfled et al., 2017; Hughes & Read, 2018) had an impact on how students use technology and internet. Meanwhile, the teachers expressed that one of the reasons influencing students' ICT skills is the lack of digital devices at school. Even though some prior studies (Hohlfeld et al., 2017; Watulak et al., 2011; Wood & Howley, 2012) found out first-level digital divide narrowed at schools in the U.S., the
current study showed accessing technology and the Internet is still a problem for some schools and many households, and digital divide is an abject barrier to improving ICT skills among teachers and students.

The third research question revealed two central themes of online education: teacher perception of online teaching and the effect of online teaching on students. First, most teachers had a negative attitude toward online teaching and believed they were not equipped with the necessary skills to teach online. The unexpected and mandatory online teaching forced teachers to learn new technologies and teaching methods with technology during the pandemic (An et al., 2021; Rhim & Han, 2020), which could be one of the reasons that the teachers were not happy about teaching online. Meanwhile, the skill to use digital technology, attitudes, and knowledge on applying these skills are significant factors affecting teachers' use of educational technologies (Spiteri & Rundgren, 2020; Van Dijk, 2020). Therefore, providing support and training may be essential to improve teachers' ICT skills and help students gain these skills (Chen & Price, 2006; Kopcha, 2012; Reinhart et al., 2011; Watulake et al., 2011). The findings made it clear that the teachers had concerns about students' accessibility to technology and some drawbacks of online learning for students, such as lack of peer/teacher interaction and time management. Early studies suggested several methods to improve interaction in online environments (Thoms & Eryilmaz, 2014; Xia et al., 2013). The main problem might be related to teachers' online teaching skills and experiences, which can be improved through professional development methods as well.

In light of the COVID-19 outbreak, it became apparent that students required access to specific technologies, the internet, and digital skills in order to reap the benefits of remote learning, while teachers needed to possess sufficient skills to teach online. According to Bourdieu's viewpoint, students and teachers struggled in remote education due to lacking capital. The digital divide that emerged during the pandemic had a profound impact on educational inequality.

**Conclusion and Implications for the Practice**

The findings of this study indicated that teachers were affected by first- and second-level digital divide during the pandemic. Some students might not benefit from online learning due to the digital divide. According to the current study, lack of access to technology and the internet, first-level digital divide, affected students from lower SES disproportionally, which is in line with other studies on the effect of COVID-19 (Azubuike et al., 2021; Moldavan et al., 2021; Sayer & Braun, 2020). Further, even though some students had technology and the internet, students’ and teachers' ICT skills impacted how they use technology and benefit from online education (Zami & Suyanto, 2021). This study revealed teachers' need for ICT training and students' lack of accessibility to online education during the COVID-19 outbreak.

The outbreak of COVID-19 has changed students' educational lives. First- and second-level digital divide concerns must be addressed to efficiently and effectively prepare students and teachers regarding using ICT to mitigate the effect of COVID-19 on inequalities in education. First, schools and classrooms should be equipped with sufficient technological resources and the Internet. Then, professional development activities should be used to guide teachers in their ICT use. Finally, teachers should be supported to use ICTs in their classrooms.
Limitations and Future Research

This study has some potential limitations. First, the data comes from teachers in a single state. Further research is needed to incorporate teacher experiences from multiple states. Second, this study only collected the data at the beginning of the pandemic to understand teachers’ first response to digital divide and online teaching. Future research could examine the effect of the COVID-19 pandemic on digital divide and online teaching longitudinally. Besides, investigating the effect of the digital divide on online education during COVID-19 with quantitative and a large sample may provide general status of education during the pandemic.

Further, third-level digital divide is beyond the scope of this article since "physical access is a prerequisite for reaching the next phases: developing digital skills, properly using a computer or the internet, and benefitting from them" (Van Dijk, 2020, p. 47). Future studies could seek to identify the effect of third-level digital on students during the pandemic. Regardless of the limitations, this study deserves our attention since the findings revealed the digital divide and online teaching during the COVID-19 pandemic from teachers' perspectives.
Author Notes

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**Tuba Gezer, Ph.D.**, is a Dean’s Diversity Postdoctoral Fellow at Educational Studies in the College of Education and Human Ecology. Her dissertation examined providing equal educational opportunities to English learners in the United States. Tuba’s research interests focus on English learners, English learners with disabilities, academic achievement, structural equation modeling, research methodology, digital citizenship, and the digital divide. She is passionate about equity and equality in educational settings.
References


Appendix

Open-ended Questions

Q1. Some students have access to digital devices (e.g., computers, tablets) and the Internet, while others do not have. This technology gap among students is described as the first-level digital divide. What is your opinion about the first-level digital divide? Do you have any experience?
Q2. The second-level digital divide is described as the disparity in students’ use of educational technologies (digital devices and software) skills. What is your opinion about the second-level digital divide? Do you have any experience?
Q3. What is the role of schools in any of digital divides?
Q4. What do you think about online teaching? How does online learning impact on your students? What options are available to provide remote learning during the period of school closure because of the Coronavirus outbreak?

Likert Scale Questions

To what extent do you agree or disagree with the following statements about the use of ICT in teaching at your school? 1= Strongly disagree, 2=disagree, 3=agree, 4=strongly agree
Q1. My school has sufficient educational technologies (e.g., computers).
Q2. The computer equipment in my school is up to date.
Q3. My school has access to sufficient educational learning resources (e.g., learning software or apps)
Q4. My school has good connectivity (e.g., fast speed and stable) to the Internet.
Q5. Educational technologies are considered a priority for use in teaching at my school
Q6. There is enough time to prepare lessons that incorporate educational technologies.
Q7. There is sufficient opportunity for me to develop expertise in educational technologies.
Q8. There is sufficient technical support to maintain educational technology resources.