Moving to Emergency, Remote Teaching

How Teachers and Students Navigated the Shift to Online Teaching and Learning During the COVID-19 Pandemic

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Introduction and Problem Statement

The COVID-19 pandemic began in the late months of 2019, and by the spring of 2020, to limit transmission of the virus, schools across the globe closed and transitioned to emergency online teaching (Jelińska & Paradowski, 2021). This transition disrupted schooling for over 80% of students worldwide (International Labor Organization, 2020; United Nations Educational, Scientific and Cultural Organization, 2020). Reverting to emergency online teaching left many teachers and faculties at the mercy of self-learning because online learning campus and school support personnel could not support a vast pool of teachers and faculties (Hodges et al., 2020). While the move to online teaching and learning was inevitable, many learners, especially in rural and remote areas, found that online schooling had particular challenges due to lack of access, lack of resources, lack of infrastructure, unavailability of devices, and a lack of qualified teachers who can assist with online learning (Dube, 2020). To transition to online teaching, teachers, too, had to adjust their instructional strategies and pedagogies (Mahmood, 2020). This study explores rural elementary teachers' (who taught online during the COVID-19 pandemic) experiences while teaching online, the challenges they faced, and their perspectives on how the students navigated this sudden online distance learning. This study will employ the lens of a digital divide to understand teachers' experiences of *online remote teaching*.

The Elementary and Secondary Education Act of 2001 mandated that schools emphasize technology integration in all

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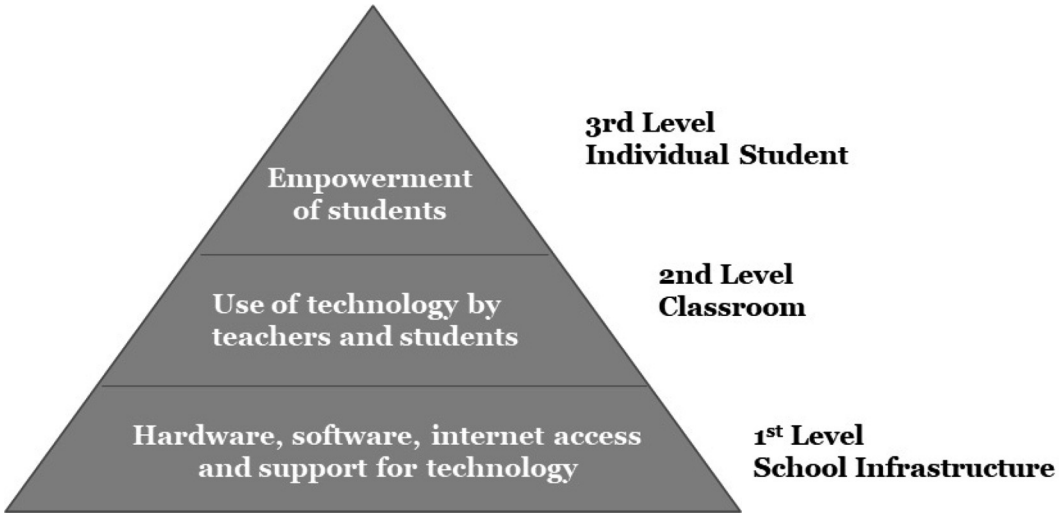
areas of K–12 education, in subject areas ranging from reading and mathematics to science and social studies (Barrett et al., 2014; National Education Technology Plan Update, 2017; U.S. Department of Education, 2011). This emphasis on technology was a provision designed to help students develop the technology skills necessary to become productive members of society in a competitive global economy (McMillan-Culp et al., 2005; U.S. Department of Education, 2011). Educational technology gained a whole new prominence during the pandemic as it became the sole means of imparting education. In K–12 education, the depth of technology integration is not homogenous as it is often decided by multiple factors such as preexisting policies on technology integration, technology inclusive curriculum, attitude and belief of teachers toward technology, professional development of teachers, technical support available to teachers and students, software, hardware, and bandwidth available, geographical location of the schools (and students and teachers), and their socioeconomic status (SES; Dolan, 2016). Thus, although many rural schools may have enough funds to make technology available for their students, there are still many students who lack access to technology at home for several reasons that could be linked to SES of student families or the general issue of access to technology (Attewell, 2001; Garland & Wotton, 2001; Lieberman, 2020; Ritzhaupt et al., 2013). The division between those with and without access to technology at (school and) home is the *digital divide* (Blackwell et al., 2014). Currently, the issue of access to technology is regarded as the *first level digital divide*, and literature shows that this gap is closing considerably (Campos-Castillo, 2015). When the issue of access is addressed, researchers may explore how technology is used and for what purposes. The *second level of digital divide* endeavors to capture the purposes and quality of technology use (Hohlfeld et al., 2008). For this study's context, the second level of divide is manifested in how technology is used in rural elementary classrooms (Sundeen & Sundeen, 2013; Thieman & Cevallos, 2017) and for distance education during the pandemic. During emergency remote teaching (ERT), how teachers and students navigated technology became a crucial component of their participation in teaching and learning (Carretero et al., 2021). Hohlfeld et al., 2008) outlined the levels of the digital divide (Figure 1), which is used as a conceptual framework in this study (Ravitch & Riggan, 2017).

This framework has been used as a logical conceptualization to contextualize *the second-level digital divide* in the K–12 context, operationalize the term, and design the research study (Ravitch & Riggan, 2017). Literature on the second-level digital divide indicates a gap in research about how technology is used in rural schools, especially in elementary classrooms (Howley et al., 2011; Resta & Laferrière, 2015). Literature states that teachers in urban schools were able to provide more opportunities for their students to engage in problem-solving, data analysis, and higher order thinking (DeWitt, 2007; Howley et al., 2011; Valdez & Duran, 2007) than teachers in rural schools because the latter mostly used technology for direct instruction, drills, and practice (Kormos, 2018). According to literature, rural schools offer limited usage of technology due mainly to factors related to slow internet speeds that limit teachers' access to instructional materials such as images and videos, as well as the ability to download documents, and other important technical difficulties, such as insufficient time, limited support, funding, and accountability testing (Howley et al., 2011; Knoblauch & Chase, 2015; Redding & Walberg, 2012). This study explores these assumptions to understand how rural elementary teachers are attempting to close the digital divide through their technology integration efforts during then COVID-19. Further, both teachers' and stu-



Source: Hohlfeld et al. (2008).

Figure 1. Levels of the digital divide in schools.

dents' technology skills were key components of their participation in *ERT* (Carretero et al., 2021).

Theoretical Framework

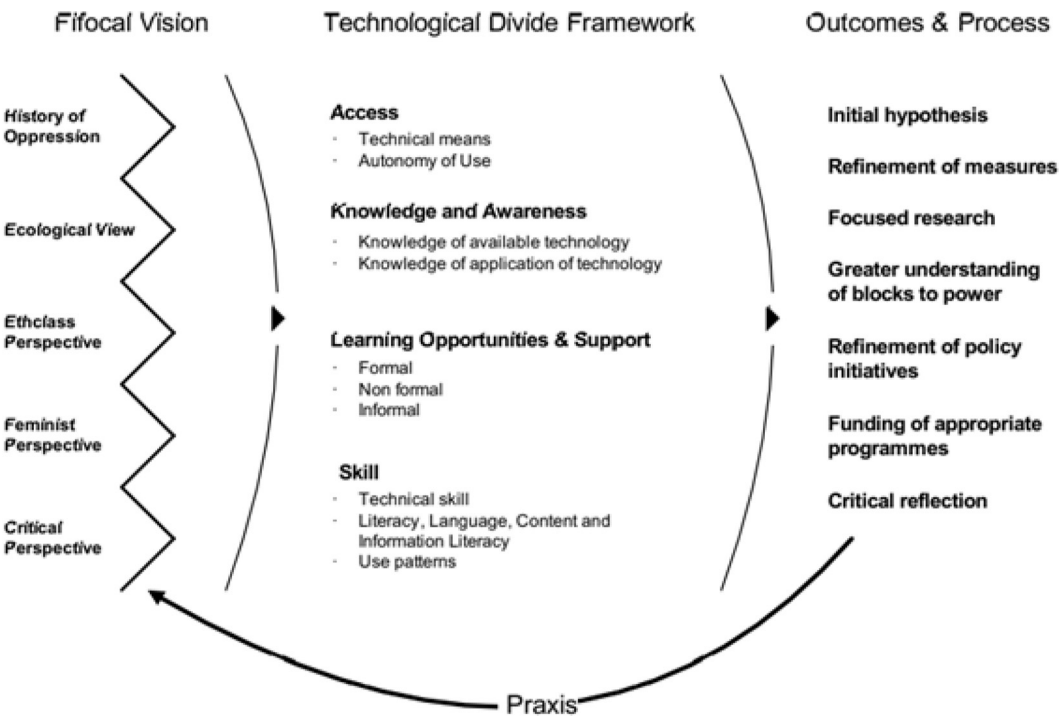
Because this study employs the lens of the digital divide, the framework for inquiry into the technological divide (West, 2006) is used as a theoretical framework to explore the relationships of the various components explored within the second-level digital divide (Ravitch & Riggan, 2017). A theoretical framework allows one to define concepts and illustrate how given research fits with and then builds on existing knowledge (West & Heath, 2009). Using a theoretical framework will also assist in a robust sense-making of the data (Neuman, 1997). I have relied on one part of this framework (technological divide framework) heavily to analyze the findings of this study that I will discuss under the findings and discussion section. The concept of a digital divide is based on issues of social inequities that may impact the use and optimization of technology (West, 2006). Education and social researchers have questioned the digital inequities and attempted to build and establish theoretical frameworks to improve the understanding of how technology is used and what factors influence its use, and the consequences of not being able to use technology (West, 2006). West (2006) introduced The framework for inquiry into the technological divide as a tool to understand the complex causes and effects of inequitable use of technology and the development of theory and practice interventions to address the digital divide.

While an education (K–12) perspective may be familiar with digital divide, it helps to elucidate the usefulness of the framework for inquiry into the technological divide (West, 2006) for understanding and analyzing the second-level digital divide in rural elementary schools and how they navigated the ERT that is the focus of the current study. Digital equity is crucial for education because students' and teachers' relations to digital technology go beyond simply accessing it; technology should promoted with critical consciousness (Freire,

2000). Freire (2000) highlights the connection between literacy, hegemonic culture, and digital inclusion because, in a polarized society, the digitally excluded population is also excluded culturally and educationally. Digital divide comes in many forms but can be defined as 'social stratification due to unequal ability to access, adapt, and create knowledge' using technology (Warschauer, 2011, p. 5). However, much of the research and policy on digital divide continues to address only one or two factors (like access) that influence the use of technology. While this has moved on from the early binary notion of whether one has access to a computer (Hargittai, 2002), theoretical frameworks have remained too limited in focus from a holistic education perspective.

Figure 2 illustrates the framework for inquiry into the technological divide (West, 2006). This framework often captures unacknowledged factors that impact the digital divide and is designed to inform research, policy, and practice. Therefore, the author aims to contribute to the understanding and conceptualization of digital inequalities in the light of both fields of practice and unique practice locations consistently and holistically.

The framework is divided into three sections: fifocal vision, technological divide framework, and outcomes and process. The leftmost column, "Fifocal Vision" consists of five elements that are crucial in understanding the different power relationships that may affect different individuals and groups within a wider society. Power is central to comprehending the digital divide as West (2006, p. 6) describes, "knowledge about and use of technology is associated with power and … blocks to



Source: West (2006).

Figure 2. The framework for inquiry into the technological divide.

power are imposed and compound to create further disadvantage." The fifocal vision performs two critical functions—it contextualizes the digital divide within the society and then allows for locating potential domains for intervention that addresses digital inequity and power imbalances that impacts it. For example, the ecological view allows me to locate this study in rural elementary schools and explore the factors that impact the digital inequity thereof, especially when rural teachers and students must participate in ERT. The middle part is the technological divide framework, representing (measurable) factors that may impact the use of technology among and between groups. Within this section, skills refer to individuals' technical skills and usage patterns (for example, teachers in this context). In the context of rural elementary schools, teachers are constantly trying to make technology an effective contributor to student success by designing effective technological integration (Kimmons et al., 2020). The right-hand most column in *the framework* is "Outcomes and Processes," representing those factors linked to the practical application of the framework for social justice outcomes associated with digital inequity (West, 2006). For the context of this study, the Outcomes and Processes could translate primarily into the arena of focused research. One of the many consequences of a digital divide is the inequitable ability to access educational, financial, occupational, communicational, and social resources, which have noted digital literacy as one of the essential literacies alongside language and numerical literacy (Department of Communication, Information Technology and Arts, 2004). In the simplest sense, K–12 education about technology use promotes students' ability to use technology so that they can access the increasing range of educational resources available, which, as the framework illustrates, entails interventions to increase access to technology, knowledge, awareness, learning opportunities, support, and skills (West, 2006).

Research Purpose

This qualitative, exploratory case study (Yin, 2014) explores how rural elementary teachers (who taught online during the COVID-19 pandemic) experienced teaching online, the challenges they faced, and their perspectives on how the students navigated this sudden online distance learning.

This study has implications for rural school district administrations in recognizing teachers' concerns and accomplishments about technology integration in rural schools and their experiences of swiftly transitioning to emergency online teaching during the COVID-19 pandemic that could have far-reaching implications for online teaching at the elementary grade levels. Since the current legislation requires students to be technologically savvy (NETP, 2017), this study also highlights the issues that rural teachers face while teaching with and through technology to instruct students who may have limited access to technology outside school (Lieberman, 2020), especially during the pandemic.

Research Question

This study explores how participant teachers in rural elementary schools (represented by four states across the United States: California, Illinois, Indiana, and Texas) transitioned to emergency online teaching during the COVID-19 pandemic. Specifically, the following research questions were addressed in the study (Kim & Bagaka, 2005): How did the participant teachers in rural elementary schools transition to emergency online teaching during the pandemic? What are their perspectives of students' experiences of the same?

Significance of the Study

The digital divide has long been a reality in which national research has been associated with age, gender, education, income, race, and geography (Ritzhaupt et al., 2020; Wei & Hindman, 2011). It hinders the goal of digital equity in supporting students' ability to develop technical skills, critical thinking, problem-solving, communication, and collaboration, which would allow them to become productive members of society (McMillan-Culp et al., 2005; Saavedra & Opfer, 2012). Digital equity promotes equitable opportunity for students from all backgrounds (Resta & Laferrière, 2015). It represents a movement to identify and eliminate the inequities and injustices that plague public education (Gorski, 2009; Gonzales-Perez, 2014). Horace Mann initiated one of the first efforts to recognize and correct inequities in schools in the early 1800s (Resta & Laferrière, 2015). Efforts to close the digital divide represent only the latest in a long history of initiatives to help address inequities in schools.

Some specific forms of inequities that the digital divide may exacerbate are what scholars and researchers have termed the *homework gap* (Powers et al., 2020). Statistics show that 70% of teachers assign homework that might require access to a computer and internet. That creates an additional challenge for those students who lack such access, like low-income students with Black and Hispanic families being 25% less likely than White families to have internet connections at home (Consortium of School Networking, 2017). The achievement gap is also a pertinent issue for educators and policymakers. The United States ranked 18th out of 37 OECD countries for graduation rates for high school students in 2018 (Organization for Economic Co-operation and Development, 2020). The COVID-19 situation has intensified the digital divide as it has been shown that along with low-income students, students of color, and many students in rural areas have not been able to adapt to the requirements of online learning because they lack the access to the necessary technology or internet connection or the skills to do so (Auxier & Anderson, 2020). These inequities have resurfaced even after many school districts have distributed iPads, laptops, or Chromebooks to their students and responded to low-income families' needs by providing internet through hotspots in school buses (Seibold, 2020). Despite these efforts, COVID-19 brought to the forefront the *first-level digital divide*, despite the claims in the literature that the gap is narrowing (Campos-Castillo, 2015), that exists in the K–12 context, among other settings (Lieberman, 2020). Previous studies on the digital divide have utilized either students (Becker, 2000) or teachers (Bracey, 2000) as units of analysis. However, research that examines the role that schools, classrooms, and teachers play on the digital divide in student technology access and usage is still scarce. Institutions need to identify some of the school/classroom infrastructural characteristics and teaching practices to minimize the disparities in access and usage of technology among students (S.H. Kim & Bagaka, 2005).

In particular, this study focuses on rural schools because they have reported increased difficulty in providing quality access to their students due to a multitude of reasons, including location, SES of student families, and size of school districts (Bouck, 2004; Howley & Wood, 2011; Lavalley, 2018). Rural schools are described as schools in a community whose population is less than 25,000 people (Cullen et al., 2006, p. 10). According to the National Center for Education Statistics (NCES, 2016), rural schools account for almost 19% of all schools in the United States (J. Johnson et al., 2014; NCES, 2016). Rural students face specific challenges like higher poverty levels, a larger migrant student population, a higher than average special education population, and a higher percentage of students with limited English

skills (Jimesron, 2004). Roughly two thirds of rural Americans (63%) say that they have an internet connection at home, up about 35% from 2007 (Pew Research Center, 2019). However, the improvement in numbers that reflect access to technology still does not reflect the actual percentage of the underserved population who are still less likely to have access to technology and the knowledge to use it (Huffman, 2018). This lack of access may be one of the reasons why rural students often find it challenging to attend online schools (Herold & Prothero, 2017). One unique characteristic of rural schools is that they offer an environment for building personalized relationships among teachers, students, and staff (Nelson, 2010). Rural schools are largely left out of research and policy discussions, thus aggravating inequities in education and widening the digital divide (Lavalley, 2018).

Additionally, some policy reforms are inapplicable to rural schools (J. Johnson & Howley, 2015). For example, charter schools in rural areas are often an expansion of the urban charter reform efforts (Ryan & Hill, 2017). Rural schools also often receive lesser funding than their urban or suburban counterparts (Showalter et al., 2017). Literature states that rural districts receive only 17% of the state education funds (Showalter et al., 2017).

Additionally, many rural schools cannot leverage some competitive grant opportunities as they may not have experienced or available staff to complete a grant application (Brenner, 2016; L. D. Johnson et al., 2014). Also, some No Child Left Behind (2001) funds cannot be implemented in rural schools (J. Johnson & Howley, 2015). Research shows that around 57% of policy insiders believed that rural education is not significant to the U.S. Department of Education (John et al., 2014). Interestingly, titles of articles in major education journals feature the term *urban* 16 times more than *rural* (Schafft, 2016).

So, we must also focus on closing the digital use divide by ensuring that all students understand how to use technology in a creative manner rather than just passively consuming content (NETP, 2017) not only within their classrooms but also when there is an unprecedented need to do so in a distance learning format This study rests on the assumption that the integration of technology in K–12 is and will continue to remain preferable.

Literature Review on Digital Divide in K–12

Online Teaching Versus Emergency Online Teaching

Teaching online has come to the forefront of education strategizing due to the unforeseen challenges of navigating education during the COVID-19 pandemic. Many institutions have had to cancel all face-to-face classes, including labs, and have decreed that faculty must move their classes online to help control the spread of COVID-19 virus (Kronke, 2020). Moving instruction online can enable the flexibility of learning and teaching anywhere, anytime. However, in this situation, the speed with which faculties moved to online instruction was unprecedented (Hodges et al., 2020). This emergency remote teaching left many teachers and faculties at the mercy of self-learning because campus and school support personnel for online learning could not support a vast pool of teachers and faculties (Hodges et al., 2020).

Zhao (2011) found that schools must strategize to adapt their mindsets, policies, and practices about technology to develop virtual technology competencies. Technology and online teaching will have minor impact on student achievement unless schools also change how instruction is designed, delivered, and supported (Barbour, 2012). Today K–12 educators have several technological tools for online teaching, which is becoming the new normal

(Norberg et al., 2011, p. 4). However, the National Education Policy Center maintains that little progress has been noted over the past few years for legislation, policy, and implementation of quality training for online teachers (Molnar et al., 2017). Several studies have examined the professional development offered to in-service teachers to ready them for online teaching skills (Lewis & Garrett Dikkers, 2016; Parks et al., 2016; Riel et al., 2016). Many researchers believe that online teaching pedagogies should be a part of the preservice teacher curriculum (Archambault et al., 2014).

Teachers are often placed in online teaching roles without any prior formal training. They are forced to either learn on the job with the help of some on-the-spot professional development or independently (Rice & Dawley, 2009). For online teaching to be successful, school administrators must concede that this form of teaching requires specific skill sets and, thus, a new adaptation to the relevant pedagogy (DeNisco, 2013). Another challenge of online teaching is a sense of alienation from one's community. A qualitative study of eight online schoolteachers reported a sense of alienation from their students and their peers because of limited interactions (Hawkins et al., 2012).

Many components of a traditional classroom, such as collaboration, are slowly finding their way into the online space (Fu & Hwang, 2018). Interactions with the teacher and the other students are crucial in motivating students to collaborate in digital environments (Cobb, 2009; Sung & Mayer, 2012). Furthermore, students' digital literacy skills and their academic and social outcomes influence the successful completion of their online collaborative activities (Blau & Caspi, 2009; Porat et al., 2018).

DiPietro (2010) noted that online learning is gaining momentum because of an essential aspect of learning, which is being able to learn anytime, anywhere. Online education can potentially help a school reach thousands of students across geographical boundaries and provide educational opportunities to those who need options (Beese, 2014; Lin, 2011). It provides options for credit recovery, additional remediation, and instructional materials, especially for students who move with their families for agriculture season or otherwise (Toppin & Toppin, 2015). For students with disabilities, online offers a respite from brick-and-mortar buildings that may not be built to the specifications of Americans with Disability Act (ADA) compliance standards (Repetto et al., 2010). In online learning, it is essential that everyone involved in the process is equally involved (Deschaine, 2018). Students' perspectives must be included in the instructional strategies applied to online learning for students with special needs (Deschaine, 2018).

Digital Divide

Though the term digital divide has been in use for over a decade, the exact origin of the term cannot be determined (Foster & Borkowski, 2004). Policymakers, educational leaders, politicians, scholars, researchers, and activists frequently employ this phrase when addressing empowerment, democracy, equity, and inclusion (Alkalimat & Williams, 2002). The term digital divide first appeared in a U.S. Department of Commerce report in 1996. It was used as an identifier to describe a divide between a population with access to technology, such as a computer, and those who did not (Dolan, 2017). Access has traditionally been defined as the right or ability of a person to use a computer system or computer program (Gorski, 2002; Norris & Conceicao, 2004). Digital equity ensures that all students have access to information and communications technologies for learning regardless of SES, physical disability, language, race, gender, geographic location, or any other characteristics that

have been linked with unequal treatment (Tyson, 2015). Equitable access to technology resources (computers, software, connectivity) is one key aspect of digital equity (Judge et al., 2004). When focusing on access, data is collected on the number of computers present in a specific geographic space (library, school, home, community center), the ratio of people to computers, and the number of computers connected to the internet (NCES, 2016). Though the United States statistically surpasses most other nations in these measures, stark inequities still exist in many rural regions, both in homes and the school environment, especially if these schools are also in low-SES areas (Sundeen & Sundeen, 2013). Although the current generation of students has increased awareness of the ubiquity of technology for learning (Friedrich et al., 2010; Palfrey & Gasser, 2013), SES of not only schools but also of the students' households, and the geographic location of the schools, all play a crucial role in how teachers and students can use technology (Ready, 2010). Among schools, too, a gap between individual districts and schools remains (Banister & Reinhart, 2011; Barron et al., 2013; Harlan, 2014; Howley & Wood, 2012). Rural schools in low-income communities have less funding, fewer resources, and less qualified or experienced faculty and staff (Banister & Reinhart, 2011). Rural areas typically do not have access to quality internet services, so even if money is not an issue, it is still challenging to obtain high-quality internet services (Owens & Song, 2011).

Many educators have pointed out that the significant issues in the digital divide are related to a lack of interest and a lack of access to technology. For example, although computers are available in schools or classrooms, many teachers or students do not sufficiently utilize them. Even when access to technology and connectivity exists, students may have unequal learning experiences (Kim & Bagaka, 2005). If their teachers choose not to use technology in their teaching, students cannot be equally prepared to become knowledgeable workers and function well in society. According to the Department of Education report (Kleiner et al., 2002), computer usage in schools primarily populated with underserved students is limited to teaching basic skills compared to affluent schools where computers are likely to be used to teach higher order literacy and cognitive skills (S. H. Kim & Bagaka, 2005).

Levels of Digital Divide

In reference to K–12, the first level digital divide reinforces equitable access to computer technology and the internet and supports such usage in schools (Blackwell et al., 2014; Hohlfeld et al., 2008). When comparisons are made about the levels of access, schools align on a continuum from least to most access to digital resources that they can provide for their students (Oblinger & Hawkins, 2006). Literature on the digital divide suggests a need for extensive examination of the manifestations of the digital divide. It is often cited in terms of the student-to-computer ratios, teacher-to-computer ratios, types of internet access, and the number of technical personnel available in a school (Adelman et al., 2002; Parsad & Jones, 2005). Access to hardware in schools has drastically improved across the United States (vanDijk, 2006, 2017), including rural areas (Pew Research Center, 2019). The Pew Research Center (2019) reported that two thirds of rural Americans have an internet connection at home. Even though many schools provide an adequate number of computers with internet connections for their students, some schools have computers that cannot be accessed by students consistently (N. Davis et al., 2007). The digital divide in schools is not limited to access and availability but also refers to how technology supports learning (Howley & Wood, 2012). Additionally, many schools

have reported that they still struggle to maintain and update hardware and software to sustain an appropriate level of access for students (Davis et al., 2007).

The first level of the digital divide was conceptualized as a gap between those who do and those who do not have access to digital technologies (van Dijk, 2006), which suggests that once the gaps in access are bridged, the use of technology would become homogeneous (Peter & Valkenburg, 2006). However, this binary approach has significant shortcomings: First, physical access to technology is linked to the sociodemographic characteristics of the population (Hargittai, 2003; Newhagen & Bucy, 2004; van Dijk, 2004, 2006). Furthermore, it may lead researchers to think that if the problem population gains physical access to technology, then the digital divide problem is solved (Newhagen & Bucy, 2004). However, having access to the internet is different from having access to the content that the internet offers (Newhagen & Bucy, 2004; van Dijk, 2004). If users lack the appropriate skills, cognitive ability, and confidence to use the internet meaningfully, then a new digital divide is created, encompassing social, economic, and political issues (Newhagen & Bucy, 2004).

The second level of the digital divide addresses how frequently teachers and students use technology in classrooms and for what purposes (Oblinger & Hawkins, 2006). The second-level digital divide is contingent upon closing the first-level digital divide because without access, neither teachers nor students can meaningfully use technology in the classroom (Hohlfeld et al., 2008). In addition, technical support personnel must be available to help teachers resolve technical issues during a class or instructional activity (van Deursen & van Dijk, 2019). The second-level digital divide is also examined by how teachers integrate technology into daily instructional practices for the prescribed curriculum (Hohlfeld et al., 2008).

Investigations into the second-level digital divide have examined the disparity between how students of different SES and those in rural locations use technology to learn and access content (Hohlfeld et al., 2008; Howley et al., 2011). Studies show that students in rural areas, including low-SES students, still face issues with access and bandwidth and do not use technology in the same way as their high-SES or urban counterparts (Howley et al., 2011; Kormos, 2018; Ritzhaupt et al., 2016). Socioeconomic status factors have also been related to how teachers use computers professionally (Adelman et al., 2002; Blackwell et al., 2014; Lyons, 2015). For example, elementary teachers in rural schools were 8% less likely than their urban counterparts to use computers for professional activities outside of instruction (M. C. Kim & Kim, 2001; NETP, 2017). Being outside the scope of this study, we will not discuss the third-level digital divide here.

School Access and Technology Use. As educators struggle to create technology-rich learning environments, the question no longer debates the effectiveness of technology in the classroom but its use to enhance learning experiences to ensure high-quality educational opportunities that meet the educational demands today. Along with reading, writing, and mathematics, technology has become the new basic in education (U.S. Department of Education, 2016). As teachers struggle to implement a technology-rich learning environment, researchers note that the educational dilemma may lie in the learning process gap between today's students, referred to as *digital natives* or *NetGeneration,* and their teachers known as *digital immigrants* (Prensky, 2001). Approximately 97% of teachers and students have access to computers during a typical school day, while others make use of smart boards, tablets, and mobile wireless devices to assist in preparation, communication, and activities (Crowe et al., 2017; Gray et al., 2010; Kervin et al., 2013; Miranda &

Russell, 2012). As an example, let us look at the technology plans for one state. A review of the Indiana School Technology Plans for 2020 revealed the following data about school districts across the state: 64% of all school districts are one-to-one at all grade levels. Of these, 23.7% were from distant rural areas, 14.6%were from fringe rural areas, and 1.0%were from remote rural areas (Indiana Department of Education, 2018). The term *one-to-one (1:1)* (One-to-one, 2013) is applied to programs that provide all students in a school, district, or state with their own laptops, Chromebooks, netbooks, tablets, or other mobile computing devices. The term refers to one computer for every student. We see here that state departments of education are attempting to close the first-level digital divide by providing access to schools. Grants are available to rural school districts to supply devices and other technology requirements to students, like the Small Rural School Achievement Grant and the Rural Technology Fund (Davis, 2019; Rural Technology Fund, 2020).

Using technology in schools is a critical direction toward diminishing the first-level digital divide of access to technology (Chapman et al., 2010). However, the development of 21st-century skills requires more than just access to technological devices: the school district's economic base must be strong enough to provide sufficient bandwidth, hire technology specialists, support professional development, and maintain equipment (Gutierrez, 2016). Rural schools view technology as an equalizer to level the playing field among students from all geographical areas and SES by building cultural experiences in all disciplines (Yentes, 2015). Differences can influence school technology use in socioeconomic status, teachers' attitudes and beliefs about technology, the amount of training teachers receive, and how technology is restricted or supported by the administration (Dolan, 2017; Ready, 2010). For example, some low-SES rural schools in Mexico gave students access to educational technology through the One Laptop per Child Project by distributing XO laptops to students who had not previously had access to technology in school (Cervantes et al., 2011). The study results suggested that creating technical and social infrastructures for sustaining technology implementation in schools is more complex than just having the technology integration in place.

When integrated meaningfully, technology can support inclusive instructional practices and equitable learning experiences that are key to closing the (second level) digital divide (Edyburn, 2013). One of the most important components that comprise the meaningful use of technology for educational purposes in classrooms is a well-trained teaching workforce (Arshad-Ayaz, 2011). Many studies have explored the issue of the low level of technology integration in public school classrooms from different perspectives (Miranda & Russell, 2012). Researchers have investigated factors that may impact teachers' technology integration plans like external factors such as availability and support, known as first-order barriers (Ertmer et al., 2012), and internal factors such as teachers' attitudes toward technology and their pedagogical beliefs, known as second-order barriers (Ertmer et al., 2012). Findings supported the concept that teachers' attitudes toward technology play a crucial role in determining how and how they will integrate technology in their classrooms (Howley et al., 2011). One of the most valuable uses for integrating technology in rural schools is improving educational equity for rural families (Howley et al., 2011, p. 3).

Literature suggests that rural students use computers significantly more for free time and extracurricular activities (Croft & Moore, 2019). Though students in rural schools had the technology available to them (Kormos, 2018), they may not have had universal access to additional

personnel as technology facilitators (Reinhart et al., 2011). The relative absence of technology facilitators in rural schools resulted in the second level of the digital divide among students (Kormos, 2018; Reinhart et al., 2011).

However, rural schools have some unique strengths concerning technology (Howley et al., 2011). One such strength pertains to teacher attitudes and beliefs about using technology in the classroom (Ertmer et al., 2012). Howley et al. (2011) found that teachers from rural schools had more positive attitudes toward technology integration than teachers from urban or suburban schools. Additionally, rural teachers were well-prepared to use technology in their classrooms because these schools recognized its value for their students (Howley et al., 2011).

Rural and nonrural schools encounter different challenges related to funding, administrative issues, technological resources, and quality of technology integration (Knoblauch & Chase, 2015). Many rural schools encounter problems with teacher turnover and shortages that impact the quality of technology access in schools (Milner, 2013). Furthermore, rural schools tend to have a higher number of English language learners and students with special needs (Lowe et al., 2019). Additionally, underfunded rural schools have used their access to educational technology to an advantage to close the language and learning gap for English language learner students and students with special needs (Cheung & Slavin, 2012). In addition, small rural schools and school districts also face the challenge of transitioning to new technology every few years, upgrading their hardware and software, and providing professional development to their teachers to integrate the new technology into their curriculum (Yentes, 2015). Other challenges include replacing aged technology, resourcing more devices and computers, and providing quality professional development for teachers to help integrate technology more effectively (Powers et al., 2020). Another perceived challenge is being unable to assign homework using technology due to lack of access and parental support and supplemented by the low level of technology integration in classrooms (Powers et al., 2020), which is the opposite of the homework gap (Consortium of School Networking, 2017). Therefore, it is crucial to explore how learning in rural schools can be relevant, personally and globally.

While technology integration is common in today's classrooms, technology can also exacerbate preexisting inequities, establish new ones, and further sideline and marginalize communities (Kimmons, 2019; Rogers, 2016). Thus, Gorski (2009) encouraged educators and researchers to challenge assumptions that more technology equals better outcomes for all and to question technology integration plans that disregard issues of equity and societal contexts. To this end, COVID-19 drew increased attention to issues of digital inequity as distance or online education, in many cases, became the sole means for continued learning and instruction (Young & Noonoo, 2020). As inequities surfaced in responses to this pandemic, preservice teachers and in-service teachers had unique opportunities to reflect on their digital privileges, analyze data relevant to the digital divide, and critically observe their local districts' digital learning responses (Ferlazzo, 2020).

Digital Inequity and Teachers' Use of Technology to Close the Digital Divide. Digital equity is a condition where all individuals and communities can use technology for civic and cultural participation, employment, lifelong learning, and access to essential services (National Digital Inclusion Alliance, n.d.). For K–12 students, this means ensuring all students have access to technology and the training to navigate digital tools. Since, within K–12, a student's acquisition of digital skills depends on how teachers design their technology use,

many educators have indicated that digital inequities can become acute due to a lack of access to technology coupled with a lack of interest in technology (Kim & Bagaka, 2005). Research shows that approximately 97% of teachers and students have access to computers during a typical school day, while others make use of smart boards, tablets, and mobile wireless devices to assist in preparation, communication, and activities (Crowe et al., 2017; Gray et al., 2010; Kervin et al., 2013; Miranda & Russell, 2012). Many teachers or students do not leverage the technology that may be available in their schools. According to literature, this may be more pronounced in rural schools as they may offer limited usage of technology due mainly to factors related to slow internet speeds that limit teachers' access to instructional materials such as images and videos, as well as the ability to download documents, and other important technical difficulties, such as insufficient time, limited support, funding, and accountability testing (Howley et al., 2011; Knoblauch & Chase, 2015; Redding & Walberg, 2012). Some other challenges include replacing aged technology, adding more resources and devices, and providing quality professional development to teachers (Powers et al., 2020). So, if teachers do not integrate technology or integrate technology with limitations in their teaching, students cannot become well prepared to use technology for their education (Kim & Bagaka, 2005). This inequity in student experiences with technology is evident in schools across a district (Kleiman, 2000), within a school, and among students themselves (Haugland, 2000). Students having deficit experiences with technology in schools may not be conducive to learning through technology or developing their technological skills. Nemer (2015) argues that technological spaces in public schools should be considered public centers for digital access. Since technological spaces are already inserted in the schools, the opportunity exists to link pedagogy and technology and help students improve their technical skills (Nemer, 2015). Teachers could use this approach to encourage a digital culture and allow students to understand better the role of technology in their lives and its intended use (Nemer, 2015). Linking pedagogy and technology would help bridge the digital inequities that may arise because of teachers' limited use of technology for instructional purposes. Literature suggests that how teachers use technology could help alleviate digital inequity (Reich, 2019). With reference to the PICRAT model (Kimmons et al., 2020) discussed earlier, teachers may refer to this model to intentionally plan their technology use to address digital inequities in students' use of technology and improve their pedagogical practices that include technology integration. When addressing the issue of digital inequities that may arise from teachers' use of technology, some practical issues emerge.

One practical issue that students face is termed the homework gap (Consortium of School Networking, 2017). This gap points to the barriers that students face when working on homework assignments without having a reliable internet connection at home (National Education Association, 2021). In 2015, 35% of lower income households with school-age children did not have a broadband internet connection at home, according to a Pew Research Center analysis of U.S. Census Bureau data (Pew Research Center, 2019). Research shows that 70% of teachers assign homework that might require access to a computer and the internet (Consortium of School Networking, 2017). If students do not have that access, then it might hinder their academic achievement. Another implication of digital inequity is students' academic success. Research shows that students with internet access at home showed higher average achievement scores than those who did not (NCES, 2016). This comparison addresses the achievement gap that shows

that the United States ranked 18th out of 37 countries for graduation rates for high school students in 2018 (Organization for Economic Co-operation and Development, 2020). This gap is also a pertinent issue for educators and policymakers, and efforts to close the digital divide may be conducive to student achievement. Learning outcomes as technology has become synonymous with education by ushering in a new model of learning where technology has been shown to scale and sustain instructional practices that would be too resource intensive to work in exclusively in-person learning environments (Mohammed, 2019).

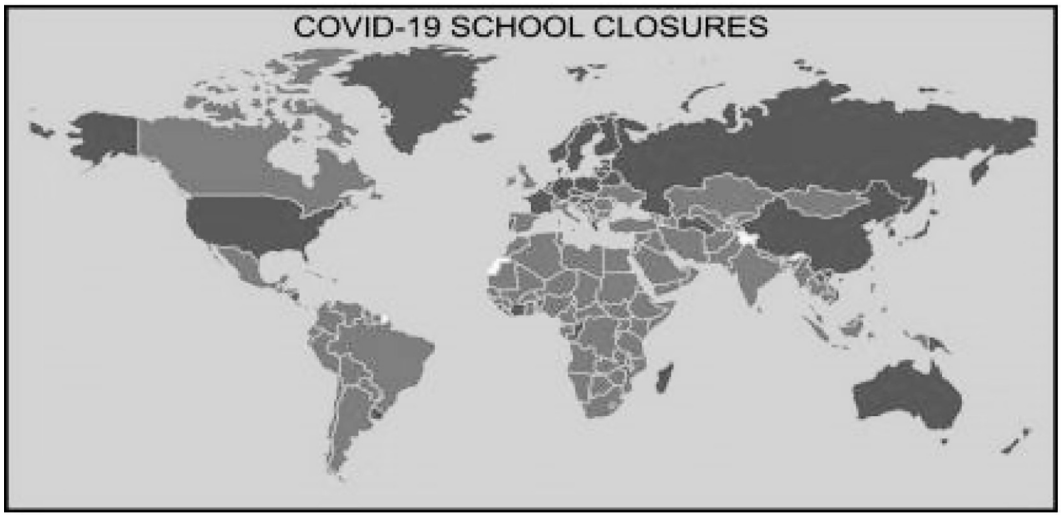
Therefore, teachers must be deeply aware of and understand issues regarding student access, develop lesson plans with inadequate access in mind, and actively teach students digital literacy (Ripton, 2021). Students with lesser access to technology typically have lower digital literacy (Ripton, 2021). However, teachers can help solve the problem by building digital etiquette into their classroom assignments. Further, schools and school districts can help provide student or staff families access, not only during an emergency but throughout the year (Ripton, 2021). Teachers should advocate for better tools and technology, like a centralized learning management system, to make learning accessible to every student (Ripton, 2021). Teachers can, therefore, play a more active and critical role in ensuring that every student, regardless of socioeconomic status, language, race, geography, physical restrictions, cultural background, gender, or another attribute historically associated with inequities, has equitable access to advanced technologies, communication and information resources, and the learning experiences they provide (Solomon et al., 2003, p. xiii). Though teachers alone cannot address the issue of digital inequity, how they integrate technology into their curriculum can make a big difference (Reich, 2019).

Additionally, many educators and researchers may challenge assumptions that more technology equals better educational outcomes for students and question technology integration plans that disregard issues of equity and societal contexts (Gorski, 2009). Teachers in K–12 must plan their technology use with care because technology can exacerbate preexisting inequities, establish new ones, and further marginalize communities (Kimmons, 2019; Rogers, 2016). In the case of rural schools, where fiscal issues may hinder their technology integration plans, grants are currently available to improve access (Davis, 2019; Rural Technology Fund, 2020). For technology integration plans in rural elementary schools, research indicates that rural teachers display positive attitudes toward technology integration, which may be critical in narrowing the digital inequity gap (Howley et al., 2011). Researchers have investigated the relationship between external factors such as availability and support, known as first-order barriers (Ertmer et al., 2012), and internal factors such as teachers' attitudes toward technology and pedagogical beliefs, known as teachers' attitudes toward technology second-order barriers (Ertmer et al., 2012). Findings supported the concept that teachers' attitudes toward technology play a crucial role in determining how and to what extent they will integrate technology in their classrooms (Howley et al., 2011). One of the most valuable uses for integrating technology in rural schools is improving educational equity for rural families. Teachers' role in bridging the digital inequity gap can be powerful (Howley et al., 2011).

Instructional Strategies During COVID-19 in K–12. Educational research over time has evaluated and analyzed the benefits of implementing technology in the curriculum (Hanımoğlu, 2018). Educational leaders and policymakers endeavor to support students in developing 21st-century skills that adequately prepare

them for college and career opportunities (International Society for Technology in Education, 2020; the NGSS Lead States, 2013). Teachers are encouraged to implement technology in the curriculum and instructional strategies to enhance students' learning outcomes (Blanchard et al., 2016). However, the COVID-19 pandemic upended the schooling and education plans for 2020 for several educational communities. Many institutions have had to cancel all face-to-face classes, including labs, and have decreed that faculty have to move their classes online to help control the spread of COVID-19 virus (Kronke, 2020). Figure 3 shows an image of school closures during COVID-19.

So, when many schools closed physically in 2020, teachers transitioned to emergency online teaching (Jelińska & Paradowski, 2021). From the elementary to the tertiary levels, educational institutions have had to seek an alternative way of continuing to provide education through an online mode via various digital learning platforms (Jandric, 2020a). This situation represents a critical phase in considering technology, pedagogy, and education (Starkey et al., 2021). To adapt to the instantaneous shift to online teaching, synchronous online conferencing systems like Zoom and Google Meet have allowed students and teachers to join and participate in an online classroom (Lockee, 2021). Other platforms include Microsoft Teams, Canvas, and Blackboard, which allow teachers to create curriculum-related educational courses, training, and skill development programs (Petrie et al., 2020). These systems have also allowed instructional presentations to be recorded for students to watch at a time accommodating to them (Lockee, 2021). They also have chat, video meetings, and content storage options to help with class organization (Pokhrel & Chhetri, 2021). These platforms also support MS Word, PDF, MS Excel, and various audio and video software (Pokhrel & Chhetri, 2021). Additionally, these platforms track student learning and assess-



Source: Kimmon et al., 2020.
Note: Color code: Pink (localized closings), Purple (countrywide closings), Blue (open). Adapted from UNESCO Global Education Coalition (https://en.unesco.org/covid19/educationresponse)

Figure 3. Global map of COVID-19 school closures.

ment through quizzes and rubric-based assessments of submitted assignments (Pokhrel & Chhetri, 2021). Students were offered experiential learning through virtual labs and field trips (Pennisi, 2020).

Though teachers used a broad array of online platforms and e-learning tools, because of the quick transition to online learning, there were gaps in assessing how online learning should or should not be leveraged by education institutions (Jandric, 2020a). While trying to close these gaps, schools and other educational institutions have created and offered an assortment of support for teachers, such as drop-in sessions, free webinars, and blog posts, emergency policy documents, social platform groups (Doucet et al., 2020), and even lessons learned from earlier university lockdowns (Czerniewicz, 2020). Teachers, too, have had to adjust their instructional strategies so that students could also adjust to their new mode of online learning (National Academy of Sciences, 2020). For example, researchers found that students faced a lack of social interaction during the emergency remote teaching phase, and teachers recognized this and prioritized student engagement by adjusting their instructional strategies for online teaching (Starkey et al., 2021). Another key challenge that emerged during the emergency remote teaching phase is access, especially in rural and remote areas. Even if there is a basic internet connection, there is the issue of other family members using the home technology (Lockee, 2021). To mitigate such issues, schools and school districts have devised innovative solutions like using school buses and school and library parking lots to provide mobile hotspots and improved signal strength, class packets sent by mail to student homes, and instructional presentations that were aired in local public broadcasting stations to facilitate students to complete their coursework (Buffington, 2020; Lockee, 2021). The limitations of the pandemic also created an opportunity for teachers to test new instructional strategies to teach curricular concepts (Lockee, 2021). Though many of the instructional approaches may have been forced and hurried, they allowed teachers to rethink issues like lengthy "seat time," interaction with students and learning principles that may benefit student learning (Lockee, 2021).

Home Access. The second-level digital divide is intensified among rural families where students may not get the access or the support they need to adopt technology, either because their parents cannot afford technology (in the case of low-SES families) or are not familiar with it (Ma, 2017). The digital divide is intensified in rural areas primarily because of bandwidth issues (Lavalley, 2018). Rural Americans are now 12 percentage points less likely than Americans overall to have home broadband (Auxier & Anderson 2020). Thus, a digital divide may still exist in rural schools despite the overall high prevalence of technology access in some rural schools (Banister & Reinhart, 2011; Barrett et al., 2014; Huffman, 2018; Judge et al., 2006; B. Zheng et al., 2013).

In the United States, 31.4% of homes with an annual income under $50,000 do not have either a computer or internet access. In contrast, households with an annual income of over $50,000, 8.4% do not have internet access (Lynch, 2017). Research shows that students with internet access at home showed higher average achievement scores than those who did not (NCES, 2018b). For parents and families, lack of access to a computer or the internet can often mean missing vital information or directly communicating with schools and teachers (Lynch, 2017; Lyons, 2015). The NCES data shows that technology access at home can also be correlated to parents' educational qualifications (NCES, 2018a). In contrast, in low-SES families, parents tended to provide lesser support for their children's technology use (Roshan et al., 2014). Therefore, the geographic location of a student's

home can also play an essential role in the lack of access to home-based internet service as they might not have access to reliable bandwidth (NCES, 2018b), which brings them to the level of the first-level digital divide.

Student Technology Use. Today K–12 classrooms include both access to and use of technology as a matter of policy and necessity (Chapman et al., 2010; Warschauer et al., 2004). The Elementary and Secondary Education Act of 2001 mandated that schools need to emphasize technology integration in all areas of K–12 education, in subject areas ranging from reading and mathematics to science and social studies (Barrett et al., 2014; NETP, 2017; U.S. Department of Education, 2011). The workplace dynamics are ever changing, employment skills are shifting, and new knowledge creation is pivotal to accommodate the rapid infusion of technology (Crane, 2005). Even though all students are expected to develop technology literacy and fluency, if their school and home background do not provide such opportunities, students may be at a disadvantage for technology-based tasks or leveraging online educational resources (Kim & Bagaka, 2005). Historically, students in rural areas have been disadvantaged as their access to online resources has been limited, if not by access to devices, then by slow internet or low bandwidth (U.S. Department of Commerce, 2021). The U.S. Department of Commerce's National Telecommunications and Information Administration (2021) released a new publicly available digital map that displays key indicators of broadband needs across the country. According to *Education Week*, in a Consortium for School Networking study, 40% of schools offered one device per child, and 43% did not, but expected to reach that goal in the next 3 years (Cavanagh, 2018). So, it is evident that access to technology is rising in schools.

Within schools, teachers' technology practices must allow students to think, solve problems, and embrace creativity while utilizing technology instead of critically using it as a standalone teaching tool (Robinson Hoye, 2017). Integrating technology in the curriculum to refocus education prompts students to get more involved in the learning process (Rosen, 2011). In classrooms equipped with one-to-one technology, students are motivated to use functions like touch screen input, handwriting recognition, text-to-speech, and built-in recreational games (G.M. Johnson, 2013). These practices can help improve their reading, writing, and math skills (Patchan & Puranik, 2016). Research suggests that technology use may affect students' academic achievement (Korucu & Cakir, 2018). Project Tomorrow (2018) indicated that 83% of parents reported believing that the effective use of technology in their child's school is important (Evans, 2018). Another aspect of technology use among students is playing video games. One of the commonplace challenges schools face in technology adoption is supporting technologies outside school and adopting them to augment teaching and learning (Hébert et al., 2021). Playing video games in the classroom "provide[s] authentic assessment that supports various 21st-century skills, such as problem-solving, critical thinking and innovation" to students (Garneli et al., 2017, p. 4). From 2003 to 2005, among students in K–12 public schools, student enrollment in technology-based educational courses increased by approximately 65% (Bartow, 2014). Students have voiced the need for more emergent technologies and more usage time in schools (Li, 2007). They felt that using simulations, visual models, and graphic tools improved their learning (Tyler-Wood et al., 2018). Additional technology opportunities at school could help motivate classwork and help them compensate for the lack of technology at home (Spires et al., 2008) and, therefore, boost their confidence levels (Li, 2007). Students may have different levels of

comfort using technology depending on their exposure to technology, school technology use, parental support, and individual agency (SRI International, 2018). Overall, many students appreciate the ease and speed of obtaining accurate, up-to-date information (Tyler-Wood et al., 2018). Students appreciate the flexibility of navigating through information at their own pace and engage in technology-integrated learning (Li, 2007).

This flexibility was evident when millions of students worldwide moved to online learning almost overnight due to the COVID-19 pandemic. Zoom (Zoom Video Communications, 2020), a video and audio digital platform, was used primarily for collaborative conferences like Skype and continues to transform how educators interact with and teach their students. Prior to the ubiquity of Zoom, other popular digital platforms to facilitate the interaction of educators with their students were Canvas, Moodle, and Blackboard. K–12 schools used Pearson, ClassDojo, Kahoot, and Haiku (Stefanile, 2020). While educational resources and activities through technology access are steadily climbing, students' ability to take full advantage of these depends on their information technology level (Stefanile, 2020). The second-level digital divide is intensified among rural families where students may not get the access or the support they need to adopt technology, either because their parents cannot afford technology (in the case of low-SES families) or are not familiar with it (Ma, 2017). The digital divide is intensified in rural areas primarily because of bandwidth issues (Lavalley, 2018). Remote rural locales had the highest percentage of students with no internet access or only dial-up access at home (NCES, 2018b).

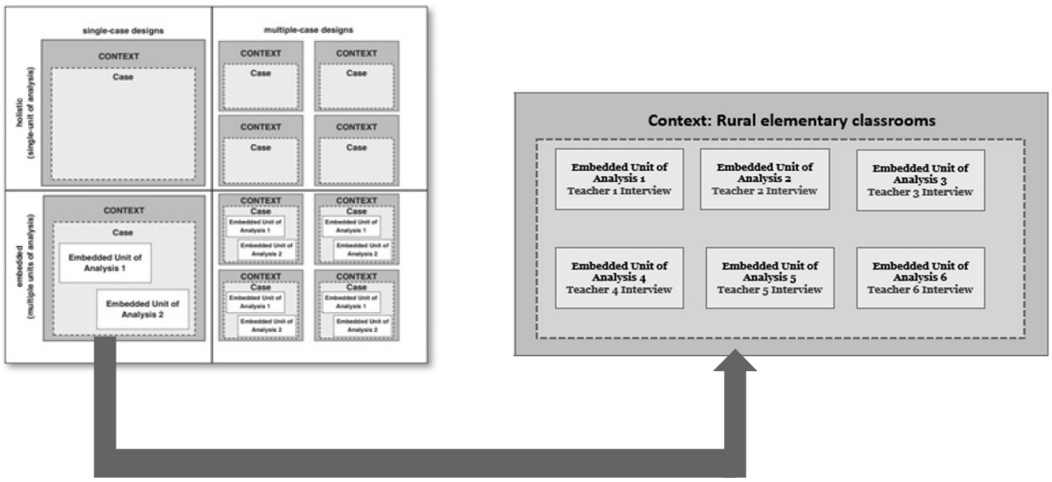
Method

This study has been designed as a qualitative, exploratory case study (Yin, 2014). Case study research is a qualitative research approach where the researcher explores a case (within a bounded system or multiple bounded systems) over a certain period of time through detailed and in-depth data collection involving multiple sources of information and reports case descriptions and case themes (Creswell, 2013). In this study, the bounded context is how teachers use technology in rural elementary schools and what their experience was while transitioning to emergency online teaching. I chose a case-study design as case studies are typically used to answer open-ended, *how* based questions (Yin, 2014) that are asked in this study. A case study can have four basic designs: a single-case study with a holistic or embedded design or a multiple-case study with a holistic or embedded design (Yin, 2014).

This research study is a single-case study with multiple units of analysis. Each unit is embedded in the context of the study. Yin (2014) states that one of the rationales for a single case is the *common* case. In the typical case, the researcher's objective is to capture the circumstances and conditions of everyday context as it helps to learn about social processes concerning theoretical interest (Yin, 2014). In this study, the *common* case is how teachers use technology in rural elementary schools and how they experience teaching online during the COVID-19 pandemic. The units of analysis are the six participants' interview responses. In summary, this case study focuses on what specific technologies rural elementary teachers use in their classrooms and elaborates on their experiences in integrating technology into their curriculum. (Schramm, 1971, cited in Yin, 1989, pp. 22, 23).

Sample

The sampling type was purposeful sampling (Fraenkel et al., 2015, Chapter 6, p. 101). Purposeful sampling is a widely used technique in qualitative research for identifying and selecting information-rich cases



Source: Yin (2014).

Figure 4. Basic types of designs for case studies.

for the most effective use of limited resources (Patton, 2002). This sampling strategy allowed for identifying and selecting participants who are knowledgeable and experienced in my phenomenon of interest (Creswell & Plano Clark, 2011). In addition, the participants were available and willing to participate in the research study (Bernard, 2002; Spradley, 1979). The research participants in this study were recruited by contact via both work email accounts and social media. The participants were identified through three avenues—lists provided by a Midwestern research university office actively working with rural schools, an organization working with rural schools, and a call for research participation in social media on rural school pages. The participants were Grade 3–6 teachers in rural schools. To have both new and experienced teachers' perspectives, I did not use a criterion based on the average number of years of teaching experience. A total of 57 emails were sent to schoolteachers (Appendix A) and principals (Appendix B), out of which I was able to recruit three participants. One teacher responded from social media posts (Appendix C), and two other teachers were recruited through snowballing from his contacts.

Research Participants. Participants were six rural elementary school teachers who met the criterion for participating in the research (they should be teaching in a rural elementary school between Grades 3–6) and those who answered the research participation call via email and social media. Teachers 1, 2, and 5 were from three different schools out of the six participants, and Teachers 3, 4, and 6 were from the same school. So, the six participants came from four different schools. The participants were named Teachers 1–6 depending on the chronology of their first interview. The participants had teaching experiences between 2–14 years. The demographic information (Table 1) of the participants is given in Table 1.

Research Context

The schools that these participants came from were situated in rural school districts (as mentioned in the school district website). The schools were in the second level of digital divide. The schools have met

Table 1. Research Participants

Teacher	Educational Background	Teacher Training/ License	Years of Teaching Exp/ Years as an Elementary Teacher	Years Using Technology for Teaching	Current Subject/ Grade Level	Technology in Classroom
1	Masters in English	Yes/multiple subjects	9/9	9	Multiple subjects/ 4rth grade	Yes. 1:1
2	Bachelors in history and classics	Yes/ multiple subjects	14/141	14	Multiple subjects/ 5th grade	Yes. 1:1
3	Bachelors in computer engineering	Yes/science and Spanish	14/9	14	Science and Spanish/4th–6th grade	Yes. 1:1 (Chromebooks)/ iPads are 1:2
4	Bachelors in Spanish bilingual administrative assistant	Yes (endorsement) / Spanish and ELA	3 (BTA) + 1/ 1	2	Spanish and ELA/ 4th grade/ co-teaching 5th grade	Yes. 1:1 (Chromebooks)/ iPads are 1:2
5	Masters in English	Yes/English and social science (BEd)	9/4	4	Multiple elementary grades (special education)/ English and social science	Yes. 1:1 Chromebooks/ iPads 1:2/ Individual communication device
6	Bachelors	Yes/ Science	7.5/6	6	ELA and science/ 6th grade	Yes. 1:1 (Chromebooks)/ iPads are 1:2

requirements of access (both devices and internet connection) to close the gap of the first level digital divide. These schools were all 1:1 as they have at least one device for each student (One-to-one, 2013). Additionally, some devices are shared. Schools have tried to provide internet access too, to those student families who did not have it or could not afford it. Most of the schools did not have dedicated technical personnel which is an identifier of the second level digital divide. Table 2 provides more information on the four schools.

Additionally, some devices are shared. Schools have tried to provide internet access to those student families who did not have it or could not afford it. Most schools did not have dedicated technical personnel, which is an identifier of the second-level digital divide. Table 2 provides more information on the four schools.

Data Collection

Data Collection Instruments

To answer the research questions, primary data was collected through conducting multiple online, semistructured interviews and reviewing lesson plans provided by the teacher participants (Fraenkel et al., 2015, p. 449). The interview data provided teachers' self-reported information on what specific technologies they were using, the purposes of their technology use, what challenges they were facing in doing so if their technology practices were

Table 2. Research Context

School No.	School Technology Resources
1	The school is 1:1 with Chromebooks in all its classroom. The Chromebooks are old versions and need to be updated. However, for remote learning, Chromebooks were given out to a student if they needed it and had no access to a device at home. Students were also assisted by the school district if they needed internet connectivity. School provides student Google accounts, ParentSquare, Clever, Zoom and other learning software or apps. Among 335 students, 21% of students are eligible for free and reduced lunch. School technology questions are directed to the teacher. The school does not have dedicated technical personnel but has access to the district technology help desk.
2	The school is 1:1 with Chromebooks in all its classroom for some part of each day. However, students must share iPads. The school has mobile technology lab including iPad labs and Chromebook labs. These labs are transported to various classrooms to allow 1:1 usage for each student for some part of each day. The devices are retained at school and not sent home with students. The school provides student Google accounts, Zoom, Rediker, Achieve 3000, SmartyAnts, and Apex Learning. All students are eligible to receive free lunch. The school has temporary technical personnel who comes in a few days every week.
3	The school is 1:1 with Chromebooks but students share iPads. During the pandemic, each student was given a Chromebook to take home to be able to continue with remote learning. The school supported those student families and staff who did not have access to internet at home. The school supports programs like Tyler SIS, Google suite, SeeSaw, and Wonders ELA/ Maravillas. Out of 365 students, 97% are eligible for free lunch and 2% for reduced lunch. The school does not have dedicated technical personnel but has access to the district technology help desk.
4	In the last academic year, the school district made Chromebooks mandatory for all students from K–12. So now the school is 1:1. Students use their district-issued device for district assessments and/or as specified by the teacher. However, students have not been given any devices to take home. School district will support the use of Google Classroom. The school district is providing mobile hotspots for student families through T-Mobile and Verizon. Out of 387 students, 8.3% are eligible for free and reduced lunch. The school has technical personnel.

Table 3. Aligning Research Questions to Interview Questions

Research Question	Interview Questions
How did the participant teachers in rural elementary schools transition to emergency online teaching during the pandemic?	7, 9, 10, 11, 12 and 17

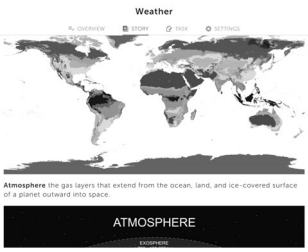
instrumental in narrowing the digital divide, and their experience of teaching online during the COVID-19 pandemic.

Table 3 maps the research questions to the interview questions. Constantly revisiting the central questions of a research study helps establish a base of reference for the exploratory interview questions (Anfara et al., 2002).

The teachers also shared 10 lesson plans in all. The lesson plans included information on which technology they would use for which subject or class activity. The lesson plans were reviewed but not separately analyzed as they did not capture any additional information about how the participants used technology in their classrooms. An example of how the lesson plans were reviewed is given in Table 4.

Before interviewing the participants, the interview questions were pilot tested (Baker, 1994) in March 2020 with two

Table 4. Review of Lesson Plans, Teacher 3

Lesson Name	Short Description	Instructional Strategies Used	Targeted Skills	Notes
Project Alpha—social science, weather 	Presenting a short lesson on weather. It is done in Classcraft. The students must go through a short video and play a game. The game rules are also explained. Then they are introduced to three new words about the weather. In the Assessment section, students are quizzed on these three words.	Game-based; clarifying definitions; words to learn, videos to watch; testing knowledge	Introducing students to concepts in social science, specifically geography.	The game approach is used to get students' attention, introduce them to content-related vocabulary, and assess their new knowledge.
Data Collection/Research: Collect data, and evidence, draw conclusions	A lesson on how to do research in social studies. Students must watch a short video and answer questions. After watching the video and answering the questions, the students must write their own hypotheses. Then they must do further research by accessing online information. Then they must find evidence to support their hypothesis and draw research conclusions.	Introducing the students to a concept first, then using an inquiry-based approach so that students can construct new knowledge.	Research skills and logical reasoning (data and evidence should align with research conclusions).	Technology is used to help students access content for research.

middle school teachers in rural schools. The interview questions were modified after the pilot test. After this, the interviews were completed (April 2020–May 2020) with six elementary school teachers in Grades 3–6 in rural schools. Each interview was about 45–60 minutes in duration.

Data Collection Procedures

To answer the research question, primary data was collected through conducting multiple online, semistructured interviews and reviewing lesson plans provided by the teacher participants (Fraenkel et al., 2015, p. 449). The interviews were completed with six elementary school teachers in Grades 3–6 in four rural schools. A total of three interviews were conducted with each participant. The interview protocol was shared with the interviewee via email before each interview. The duration of each interview ranged from about 45–60 minutes. The interviews were conducted online due to the limitations of the current situation using the Zoom video conferencing platform (Zoom Video Communications, 2020). All six participants also shared lesson plans via email that answered multiple data sources for data validation and triangulation purposes. The data was collected over 2 months, from April to May 2020.

After the interview data was transcribed, it was followed by member checking to validate the accuracy of the responses (Birt et al., 2016).

Data Analysis

Thematic analysis (Clarke & Braun, 2013) was used to analyze the interviews. This form of data analysis is highly suitable for exploring people's opinions and perspectives and their knowledge, experiences, and values about the issue being researched from qualitative data like interview transcripts (Clarke & Braun, 2013). The analysis was done primarily through a six-phase approach: familiarization of the data, generating initial codes, searching themes, reviewing themes, defining and naming themes, and then finally writing the narrative (Braun & Clarke, 2006).

All 18 interviews were transcribed in the first phase, and notes were taken. The transcribed interviews were also shared with the participants for member checking. Data was read repeatedly, keeping the research questions in mind. This repetition helped me familiarize myself with the data. The interesting features were coded across all the interview data in the second phase. In this phase, 302 codes emerged. Then the data was collated according to each code. In the third phase, the collated codes were grouped under some common themes called candidate themes (Braun & Clarke, 2006). Initially, 172 candidate themes emerged (the breakdown is given later). The candidate themes were narrowed to 14 in the fourth phase. In the fifth phase, these 14 themes were placed under three broader themes that reflected a pattern of shared meaning (Braun & Clarke, 2006). These broader themes were teacher attitude toward and preparation for technology use (45 candidate themes), technology in face-to-face classrooms (19 candidate themes), student technology use (49 candidate themes), and online teaching (59 candidate themes). The 14 themes (from the fourth phase) were described under the Findings and Discussion section in the final phase.

Table 5 gives an example of the data analysis structure.

Validity, Reliability, and Transferability

To ensure credibility (internal validity) of the data, the data was triangulated (multiple interviews and lesson plans), and member checking was conducted after the interview data was transcribed. The similarity in responses by the research participants during the interview process helped corroborate the research instrument and ensure the accuracy of responses (Stevenson & Mahmut, 2013). To establish transferability (external validity), I have aimed to provide *thick descriptions* (Geertz, 1973) of the research context and the research participants and employed purposive sampling to recruit the research participants (Fraenkel et al., 2015, p. 101). To maintain the reliability of the analyzed data, one other doctoral student reviewed the transcripts and the codes and themes that emerged for interrater reliability (IRR) (McDonald et al., 2019). Interrater reliability is how two or more raters (or coders) agree (Lange, 2011). Out of the 123 candidate themes that emerged, the inter raters agreed on 120 candidate themes, which brought us to a .97 or 97% interrater agreement. To find this percentage, we divided the number of agreed themes by the total number of themes and then converted that to a percentage (Glen, 2016).

This study's trustworthiness criteria (Lincoln & Guba, 1985) are illustrated in Table 6 (Anfara et al., 2002).

Findings and Discussion

This study explored how elementary teachers in rural schools use technology in their classrooms and how they transitioned to emergency remote teaching. To

Table 5. Thematic Analysis Example

Interview Data [After Member-Checking] (Phase 1: Familiarization of Data)	Code (Phase 2: Coding)	Candidate Theme (Phase 3: Searching Themes)	Theme (Phase 4: Reviewing Themes)	Broader Theme (Phase 5: Defining and Naming Themes)
Teacher 6: So our district was very, very thoughtful and knowing that we not only have families that don't always have quality online access, but we have some staff that don't always have quality internet access.… Do everything you can to reach the kids that you can. But know that you're not going to get 100% participation. But if you can get some kids, you can really get these kids and see how they're doing.	Families and staff have issues with access to the internet, Do everything to reach the kids you can.	Families and staff without quality access to the internet	Issues with access.	Teaching online.

Table 6. Trustworthiness Criteria

Criteria	Strategy Employed
Credibility	• Triangulation • Member checking
Transferability	• Provide thick descriptions • Purposive sampling
Reliability	• Triangulation • Inter-rater reliability checking

answer these questions about how teachers use technology in rural elementary classrooms (and if these practices impacted the second-level digital divide) and how they transitioned to emergency remote teaching during the pandemic, I conducted three interviews with six teacher participants. During the data analysis phase, I developed four themes using thematic analysis (Braun & Clarke, 2006), including teacher attitude and preparation for technology integration, technology use in face-to-face classrooms, student technology use, and online teaching. Under these themes, 14 subthemes emerged.

In this section, I have discussed these subthemes as the study findings (Braun &

Clarke, 2006) and interpreted them concerning the literature (Bem, 2003) and the theoretical framework, the framework for inquiry into the technological divide (West, 2006). Based on these study findings, I also discuss the implications for research and practice and study limitations. I would also like to mention that since teachers also talked to me about their perspectives on how students used technology in the classrooms and their homes, this understanding also informed how I analyzed the data.

Emergency Online Teaching

Teachers learned to use Zoom or Google Meet rapidly by self-educating via YouTube tutorials. One teacher said, "I'll need to keep learning programs to teach and help my students better with remote learning [Teacher 4]." One teacher mentioned that they lack the experience to teach online. So, this was a new learning curve for them [Teacher 2]. These challenges can be linked to the knowledge of the application of technology and technical skills and information literacy illustrated in the framework for inquiry into the technological divide (West, 2006). Some schools do not have many opportunities for the technological advancement of teachers. This finding reflects the literature findings that mention that teachers are often put in the role of online teachers without receiving specific training in acquiring and mastering distinct skill sets and relevant pedagogy for teaching online (DeNisco, 2013; Rice & Dawley, 2009). All the teachers in this study expressed their beliefs about the benefits of continued professional development, especially for unseen contingencies like this. The National Education Policy Center maintains that very little progress has been noted over the past few years regarding legislation, policy, and implementation of quality training for online teachers (Molnar et al., 2017). Though several studies have examined the professional development offered to in-service teachers to ready them for online teaching skills (Lewis & Garrett Dikkers, 2016; Parks et al., 2016; Riel et al., 2016), researchers think that online teaching pedagogies should also be a part of preservice teacher curriculum (Archambault et al., 2014). Additionally, teachers expressed that they were not prepared for the pressures made on them by the administration and parents [Teacher 2].

Due to emergency online teaching being such a novel experience for teachers in traditional schools, one teacher expressed that they also needed more time to plan for it than they did for their face-to-face classes [Teacher 3]. While working on projects, students were now operating at their own pace. So, teachers had to work ahead four or five steps in advance. Before trying something online with the students, teachers felt better prepared if they tried it out themselves to address any issues that might come up later. One teacher said they also took to social media to see what other teaching communities were doing and shared online resources [Teacher 6]. This finding does not reflect the findings in the literature, which says that online teachers felt a sense of alienation from their peers (Hawkins et al., 2012). Some districts were extremely understanding of the situation, and rather than stressing how much the students were learning, they instructed the teachers to observe their emotional well-being.

Concerns About Emergency Online Teaching

Teachers have many concerns about emergency online teaching because families still suffer from poor connectivity. These students, therefore, become more vulnerable during such times when learning must be done online. One teacher said, "Will they be able to use it and do it because it's very remote. I'm not next to them helping them" [Teacher 1]. Literature suggests that one of the perceived

challenges that rural teachers face is not being able to assign homework using technology due to a lack of access and lack of parental support (Powers et al., 2020). Though this did not surface as a finding in this study for classroom teaching using technology, this was one of the challenges teachers faced when teaching online.

Interestingly, even as schools have gone entirely online, some schools which previously used workbooks would also assign offline work to the students from the workbooks. Later the students would take a picture of their finished work and share it with the teachers for feedback. The main concern about this was not being able to give the students feedback in time. This concern did not reverberate in the literature on online teaching as a finding for challenges in online teaching.

Teachers also believe that working with technology has limited their ability to work with students one on one. For example, one teacher observed that "It is hard to build on personal connections, read and understand body language and teach in person. I feel that my time, my energy, and my relationships that I had built with the students were wasted" [Teacher 2]. A qualitative study of eight online teachers reported a sense of alienation from their students because of limited interactions (Hawkins et al., 2012).

Though the literature on collaboration in digital environments does not state the complete failure of online collaboration, research suggests that much success of collaborating online depends on how good the students' digital skills are (Blau & Caspi, 2009; Porat et al., 2018). In the situation of emergency online learning, students and teachers did not find enough time to be prepared for learning online, which was very frustrating to the teachers. One teacher said she enjoyed being able to teach online to connect with their students. They were worried that some students had to attend Zoom while they were home alone [Teacher 6]. In that school district, several parents worked at a local factory. These parents had to leave their children alone at home because school was closed. The teacher felt that being home alone and not being able to garner support for online learning made these children quite vulnerable. She expressed that in cases like this or when parents could not better support their children's education, family dynamics affected students' success in online learning. "Some students do not even know how to use the email" [Teacher 4]. Teacher 1 mentioned that sometimes "Parents not well-versed with technology."

Teachers also felt it was difficult to teach online "because students' (technology) levels are not the same it is challenging to teach online" [Teacher 4]. One teacher felt that some in-depth instruction was lost during online teaching for special education students. "Some difficult concepts would have been handled better in the classroom by the teacher" [Teacher 5]. She also felt that it was difficult to work on the student's Individualized Education Program (IEP) goals because many of these were for sensory skills [Teacher 5]. Literature suggests that providing online education and support to students with special needs requires everyone involved in planning and executing a student's IEP (Deschaine, 2018). Teachers felt confident rectifying minor glitches that occurred during online teaching. However, if there were something that they could not attempt to do or they lost connectivity with a student, they would request another teacher to help or connect to that student [Teacher 4].

Changes in Instructional Strategies

This research study states that teachers either moved to Zoom or Google Classrooms as mandated by their school districts. This change in strategy is corroborated in the literature that from the elementary to the tertiary levels, educational institutions have had to seek an

alternative way of continuing to provide education through an online mode via various digital learning platforms (Jandric, 2020a). As teachers quickly recognized that access surfaced as a major issue during the pandemic, they quickly adjusted their instructional strategies to limit the students' extraneous cognitive and access-related load. In the literature review, researchers found that students faced a lack of social interaction during the emergency remote teaching phase. Teachers recognized this and prioritized student engagement by adjusting their instructional strategies for online teaching (Starkey et al., 2021). One teacher mentioned that they gave basic assignments to the students for which they could give more immediate feedback [Teacher 1]. Communicating with the students became crucial, and classes could meet synchronously via Zoom or Google Classrooms. Some teachers also continued to allow offline work that could be later submitted through a cellphone [Teachers 2 and 6]. Schools and districts offered a variety of ways to provide access to the internet for student families and also provided devices. Buffington (2020) and Hodges et al. (2021) corroborated that to mitigate the lack of internet services, schools, and school districts have developed innovative solutions like school buses and library parking lots to provide mobile hotspots and improved signal strength. Teachers felt that technology is beneficial in modifying lessons [Teacher 2]. Literature mentions that the limitations of the pandemic also created an opportunity for teachers to test new instructional strategies to teach curricular concepts (Lockee, 2021). Teachers tried to adapt their technology practice and worked ahead of time to be able to answer any technology issues that students might have [Teacher 3]. Teachers did not aim for 100% online participation from students but instead focused on their emotional and physical well-being [Teachers 2 and 6].

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Teachers think that teaching online is very different from teaching face to face. One teacher mentioned that "many of them will require more guidance using the

programs" [Teacher 4]. They described various challenges they faced teaching online. For example, while working on projects together online, one teacher remarked, "it's really hard because they don't do at the same time they do not connect, they'll work independently.… Collaboration is not possible" [Teacher 3]. Though the literature on collaboration in digital environments does not state the complete failure of online collaboration, research suggests that much success in collaborating online depends on how good the students' digital skills are (Blau & Caspi, 2009; Porat et al., 2018). In the situation of emergency online learning, students and teachers did not find enough time to be prepared for learning online, which was very frustrating to the teachers. One teacher said she enjoyed being able to teach online to connect with their students. They were worried that some students had to attend Zoom while they were home alone [Teacher 6]. In that school district, several parents worked at a local factory. These parents had to leave their children alone at home because school was closed. The teacher felt that being home alone and not being able to garner support for online learning made these children quite vulnerable. She expressed that in cases like this or when parents could not better support their children's education, family dynamics affected students' success in online learning. "Some students do not even know how to use the email" [Teacher 4]. Teacher 1 mentioned that sometimes "Parents not well-versed with technology."

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Issues With Access

The framework for inquiry into the technological divide (West, 2006) defines access by technical means and autonomy of use. Here I will discuss my findings mainly about technical means of access. In many school districts, student families and staff did not have quality internet connection. This problem is resonated in literature as a grave concern about teaching online is the lack of continual access to reliable internet bandwidth (Huffman, 2018). The school districts gave out iPads, Chromebooks, and laptops that the students were using in school to solve the issue of access to a device. These devices were extremely beneficial because now students had their own devices to work from. Some school districts also helped student families and staff who did not have access to quality internet connection by parking school buses connected to Wi-Fi and hotspots in neighborhoods where such student families were present. They also tried to connect families to corporates giving good deals on Wi-Fi connections. However, some districts were not able to do this. These findings are concurrent with characteristics of the first level digital divide (Gorski, 2002; van Dijk, 2006). One teacher mentioned that sometimes student families might not have internet connection for a month or so because they moved, or parents went beyond their means to pay for internet connection because it would benefit their children's

education [Teacher 3]. Also discussed in the literature, households in rural places may have to move during the agriculture season, disrupting their previous access to the internet and impacting their children's education (Toppin & Toppin, 2015). However, the literature also reflects the provision of continual access to education through online teaching during this period when online education can potentially help students across geographical boundaries and provide educational opportunities to those who require options (Lin, 2011). Today educators have numerous technological tools to make online learning more common among students (Norberg et al., 2011. p. 4). However, even with all the school districts' support extended to student families during the COVID-19 pandemic, this study's findings indicated that teachers did not get 100% participation while meeting on Zoom or Google Meet.

Rural elementary teachers have shown tremendous resilience since they began *emergency remote teaching* during the pandemic. The self-taught sought help from other colleagues and social media and continued teaching through an online medium that they may not have used before to this length. They quickly understood the need to adapt their instructional practices for this new teaching mode and did so. Most importantly, teachers put students first. Instead of prioritizing only education, teachers prioritized students' emotional and physical well-being. They understood the vulnerability of their elementary grade students who were left alone at home to navigate a new online space for education, sometimes without parental support. Beyond any finding of the digital divide, this is a universal call for human resilience and kindness.

Student Technology Use

Digital Citizenship

One teacher participant mentions that students must learn about digital citizenship before using technology responsibly [Teacher 1]. So digital citizenship lessons are embedded in their classroom curriculum. Students today are already technology savvy [Teacher 1], so they must know the dos and don'ts of technology use. Tech-savvy students constantly interact with technological tools daily (Robinson Hoye, 2017). One teacher mentioned that since students use many social media and have their own cellphones that they bring to school, she needs to know what the students are using so I know what is affecting them [Teacher 2]. Sometimes students use technology outside school policy [Teacher 2], so they need to be reminded of that constantly and monitored continuously. Schools put a tab on students' computer usage, but one teacher stated that students still change tabs and play video games [Teacher 3]. This finding is corroborated in the literature that one of the commonplace challenges schools face in technology adoption is how to support outside school technologies and adopt them to augment teaching and learning (Hébert et al., 2021). Playing video games in the classroom "provide[s] authentic assessment that supports various 21st-century skills, such as problem-solving, critical thinking and innovation' to students" (Garneli et al., 2017, p. 4). Sometimes there is parental involvement in whether a child is old enough to be on a specific app or website [Teacher 2]. One teacher expressed that since students use much technology for social media and games, educating them on digital citizenship is crucial [Teacher 6].

Home Access. During this study, student technology use was entirely home based for a large part of this study. In the United States, 31.4% of homes with an annual income under $50,000 do not have either a computer or internet access. In contrast, for households with an annual income of over $50,000, 8.4% do not have internet access (Lynch, 2017). The study findings corroborate this manner of information. Literature states that even though

all students are expected to develop technology literacy and fluency, if their school or home background does not provide such opportunities, students may be at a disadvantage for technology-based tasks or leveraging online educational resources (Kim & Bagaka, 2005). Historically, students in rural areas have been disadvantaged as their access to online resources has been limited, if not by access to devices, then by slow internet or low bandwidth (U.S. Department of Commerce, 2021). The second-level digital divide is intensified among rural families where students may not get the access or the support they need to adopt technology, either because their parents cannot afford technology (in the case of low-SES families) or are not familiar with it (Ma, 2017). The framework for inquiry into the technological divide (West, 2006) recognizes access to technical means as one of the factors that may impact the use of technology among and between groups.

During the COVID-19 pandemic, access to devices and reliable internet or bandwidth was a major issue. The teacher participants mentioned that their school districts with their own devices, especially if they had no access to one. One school district sent out a survey to examine which students did not have access to devices and the internet [Teacher 1]. However, all school districts could not provide internet to all those who do not have internet [Teacher 5]. One teacher mentioned that out of their 14 students, and one student had no access to a device or an internet service [Teacher 2]. Other students had individual or at least shared access to devices. Teachers stated that cell phone access is more prevalent than access to any other device or internet, and while those could be used to access information, they were difficult to work on [Teachers 3 and 6]. In this study, teachers mentioned that many of their students had access to individual and shared cell phones. Another teacher mentioned that sometimes students have access to devices at home but no internet [Teacher 4]. If they had shared access to devices, that is not a good scenario because they need their own devices and a stable internet connection. However, if the district provided them with a Chromebook, they could at least continue working on that. In certain situations, as one teacher stated when families move because they are agricultural workers or for some other reason, they lose access to their internet connections. During COVID-19, teachers witnessed that families make other sacrifices to provide for internet for their students.

Project Tomorrow (2018) indicated that 83% of parents reported believing that the effective use of technology in their child's school is essential (Evans, 2018). However, research also indicates that parental support for educational tools and processes can play a role in their child's dispositions regarding these technologies (del Carmen Ramírez-Rueda et al., 2021). This factor is essential, especially when parents do not always have the same educational experiences using technology (Ramírez-Rueda et al., 2021). The teacher participants shared similar thoughts that parental support was critical for elementary grade students who were learning from home. One teacher mentioned that parents are not fluent with technology, so they cannot support students at home. Language is also an issue for parents from other racial and ethnic backgrounds [Teacher 1]. Parents have had to continue working in many student families, so they are tired and cannot support their students' online learning [Teacher 4].

Different Levels of Student Technology Use. Teachers agreed that students themselves use technology for various purposes and reveal different levels of technology use for different reasons. This diversity is supported by literature as students may have different levels of comfort using technology depending on their exposure to technology, school technology use, parental support, and individual agency (SRI

International, 2018). While educational resources and activities through technology access are steadily climbing, students' ability to take full advantage of these depends on their information technology level (Shulman et al., 2004). The narrative of students' technology use can be tied to the ecological view under the fifocal vision (rural elementary classrooms in the context of this study) and the aspect of knowledge of technology applications, learning opportunities, and skills of technology use that students develop, which is described in the framework for inquiry into the technological divide (West, 2006). Two teachers mentioned that technology was beneficial for their special education students, but the difference in technology use depends upon students' cognitive abilities and their IEPs [Teachers 1 and 5]. Teachers agree that students use online resources for educational purposes, mainly for research, but a very small percentage use them for additional learning [Teachers 1 and 6]. However, as one teacher mentioned, interest in using technology for learning may arise from their engagement in what they are learning [Teacher 6]. Teachers agree that students are technology savvy and use social media often [Teachers 1, 2, and 6]. Studies show that in classrooms equipped with one-to-one technology, students are motivated to use functions like touch screen input, handwriting recognition, text-to-speech, and built-in recreational games (G.M. Johnson, 2013). These practices can help improve their reading, writing, and math skills (Patchan & Puranik, 2016). However, teachers in the study also worry that too much technology consumption may be harmful to them. One teacher expressed that using voice-to-text technology is not helpful for students learning to write. Too much technology hinders students' abilities to depend on their cognitive abilities [Teacher 2]. Students' ability to leverage technology may depend on their interests, and some are more proactive than others [Teachers 1 and 3]. Some students like technology more than others. If they are engaged in their learning content, then interest in using technology for learning may arise from their engagement in what they are learning. Teachers seemed a little concerned that although students use technology for social media and games, a very small percentage use them for additional learning [Teacher 6]. Sometimes, students' use of technology is restricted if there is parental involvement in whether a child is old enough to be on a specific app or website. In other cases, even if students have devices at home, parents do not allow them to use them, so they are not comfortable using those devices. These may lead to students' lack of comfort in using certain technologies. When elementary grades, students were learning from home, and lack of parental support could also lead to their slower adaptation to technology [Teacher 4]. However, teachers feel that during the pandemic, students displayed unprecedented flexibility when, irrespective of their technological skills, millions of students worldwide moved to online learning almost overnight (Stefanile, 2020).

Literature shows that additional technology opportunities at school could help motivate classwork and help them compensate for the lack of technology at home (Spires et al., 2008) and, therefore, boost their confidence levels (Li, 2007). During the pandemic, teachers felt helpless because they were not next to students to help them navigate technology in learning [Teacher 1]. Online learning is challenging for kids who are struggling or already vulnerable.

The findings show that rural elementary teachers plan for intentional and meaningful technology practices for their students within their classroom. Before the COVID-19 pandemic, students without access to devices or internet connection at home could make up for this deficit in technology use during school hours. In that respect, rural elementary teachers

contribute to narrowing the second-level digital divide. However, once students were relegated to their homes during the pandemic, they were thrown back into the first level digital divide, where access had again become an issue of severity that could potentially impact students' online education.

Implications for Research

The findings of this study suggest that teachers in rural elementary schools have a positive attitude toward integrating technology into the curriculum. They receive formal (technology training during preservice teacher training programs), nonformal (professional development opportunities through attendance in conferences and webinars and training provided by companies whose products a school or school district is using), and informal (support from colleagues and family members who are adept at using classroom technologies) learning opportunities and support for using technology. Teachers usually begin incrementally using technology, but they feel that technology can be overwhelming, and they need to keep pace with emerging technologies. Teachers need investment in time to learn new technologies that they can integrate into their classrooms. So, a teacher's technical skill level influences their technology usage. Therefore, teacher participants in this study have expressed the need for continual professional development to keep up with upcoming technologies. Schools and school districts need to explore avenues of funding that will help support their technology integration plans so that teachers and students do not experience an interlude in their technology experiences. For times of critical needs like a pandemic, educational researchers, policymakers, and practitioners can implement online teaching pedagogies and instructional practices for pre- and in-service teachers in their professional development efforts.

The findings of this study further suggest that technology is used in rural elementary classrooms for several purposes like drill and practice, guided research, creating content hooks, teaching students to code, reading comprehension for languages and ELL, as a platform for assigning and submitting assignments, formative assessments, and benchmarking tests. Technology is beneficial for special education teachers using voice-to-text software or helping their students practice writing or keyboard skills. These findings answer the research question about how and for what purposes participant teachers use technology in rural elementary classrooms? The teacher participants in this study use several technology platforms for their teaching and classroom management. Given research on technology use in classrooms in rural classrooms (Kormos, 2018; Polly & Binns, 2018; Ritzhaupt et al., 2016), this study's findings have indicated the importance of how technology can be used in classrooms in a planned and purposeful manner even in schools that have fewer resources and are located in rural regions if the teachers are motivated about using technology. Interestingly, teachers also feel that using technology to replace everyday activities (like using voice-to-text apps for writing) can be detrimental to students' writing and grammatical skills. Teachers are also wary of technology satiation and plan to avoid it by sometimes changing the technology they regularly use in their classrooms.

During this study, when schools closed due to the COVID-19 pandemic, schools and school districts faced the repercussions of their student families' issues with access that was shown in the literature to have been considerably narrowed down (van Dijk, 2006). Schools could solve one part of the issue with access to devices by distributing laptops, Chromebooks, or iPads to their students. Students who did not have their own devices now had to access schoolwork from home. However,

the more fundamental issue that surfaced was that many student families and even staff members did have access to quality internet connection. This finding refers to the research question on teachers' experiences with emergency online teaching. The issue of access (to the internet; considered an identifier of the first level digital divide) moved to the forefront. Without this key resource, any attempt at online teaching would fail miserably. Literature indicates that schools have made improvements in closing the digital divide. However, gaps still exist regarding technology access for students at home as they may not have reliable bandwidth and the skills to use it (Huffman, 2018). There should be a renewed look at the first level digital divide to assess how much of the gap in physical access to computers and other devices and quality internet access is narrowing in reality for rural and low-income families and how researchers, educators, and policymakers can contribute toward it.

This study also brought to the forefront how ill-equipped teachers may have found themselves when they were required to teach online. Literature mentions that the National Education Policy Center maintains that very little progress has been noted over the past few years for legislation, policy, and implementation of quality training for teachers to teach online (Molnar et al., 2017). Though there has been some research on the professional development offered to in-service teachers to ready them for online teaching skills (Lewis & Garrett Dikkers, 2016; Parks et al., 2016; Riel et al., 2016), many researchers believe that online teaching pedagogies should be a part of preservice teacher curriculum as well (Archambault et al., 2014).

Implications for Practice

In light of the previous discussion, the findings in this research suggest that schools and school districts should continually provide professional development opportunities for their teachers to help them integrate technology into their curriculum in a planned and effective manner. For this, school districts should also explore new funding avenues to help support their technology integration plans. Continued professional development will ensure that teachers can continue integrating technology for instructional and noninstructional purposes and keep pace with upcoming technologies that might be useful for them. This study also highlighted the need to include online teaching pedagogies in preservice teacher curriculums and in-service teachers' professional training agendas. This inclusion will help teachers be better prepared to continue teaching seamlessly in the face of any emergencies or teaching online for any other purposes. This study showed how teachers put students first and adapted innovative instructional practices to aid students in continuing their education. In this manner, they actively contributed to narrowing the second-level digital divide.

As this study shows, many students do not have access to technology at home or do not have access to a quality internet connection. This issue became more acute during the pandemic when the students had to continue online learning from their homes. Researchers, educators, and policymakers must attend to this issue to provide quality internet access to rural and remote areas to close the first-level digital divide in reality. The findings of this study about how some students in rural households lack access or parental support may also have robust implications for improving students' experience using technology to improve their learning outcomes as specified in their curriculum. This knowledge provides an opportunity to narrow down the second-level digital divide, where teachers must strive to plan their technology integration to allow for more homogenous technology use for their students. This measure has implications for students' academic success as research shows

that students with internet access at home showed higher average achievement scores than those who did not (NCES, 2018b). This finding addresses the achievement gap that shows that the United States ranked 18th out of 37 countries for graduation rates for high school students in 2018 (Organization for Economic Co-operation and Development, 2020). Addressing the achievement gap is also a pertinent issue for educators and policymakers. Efforts to close the digital divide may be conducive to student achievement and learning outcomes as technology has become synonymous with education by ushering in a new model of learning where technology has been shown to scale and sustain instructional practices that would be too resource-intensive to work in exclusively in-person learning environments (Mohammed, 2019). The findings of this study show that teachers in rural elementary schools are attempting to narrow the second-level digital divide by inculcating good digital citizenship practices for their students, providing devices and internet connection (where necessary) during the pandemic to contribute to their education continuity and technology integration, and adapting their instructional practices during the pandemic.

Limitations of the Study

I selected elementary teachers from rural schools to explore through the lens of the digital divide and how technology is used in rural classrooms. I selected these teachers through purposeful sampling (Fraenkel et al., 2015, p. 101). This research focus might lack some crucial facets of technology use that might not have surfaced in the narratives of the research participant teachers. The interview data was collected based on the teachers' self-reported answers to the interview questions. Therefore, data may be affected by the self-representation bias of the teacher participants.

Conclusion

This study explored how elementary school teachers in rural schools used technology. A crucial factor in how teachers used technology was their attitude, and all the participants displayed a very positive attitude toward using technology. They mentioned that technology integrations must be more intentional and attentive to student needs. Students should also be continually educated on digital citizenship. Participants agreed that more focused professional development opportunities would be beneficial for them to know more about current classroom technologies and how to integrate them into their curriculum. The aspect of online teaching came up as one of the findings in this study. Where teachers were also excited to be teaching online, they were also anxious about their online teaching skills and agreed that professional development efforts should also include online teaching pedagogies. Teachers were further concerned that many students still did not have regular, stable internet connections at home. Therefore, during the pandemic, it was difficult to connect to these students regularly, teach them, and provide immediate feedback on their work. They were also worried that in the case of online learning, some students could not get support from their parents either because they were not fluent with technology or because their parents were working too and were busy and tired. Therefore, the issues of access to technology also came up as a finding in this study which indicates that though the first level digital divide may be narrowing in many areas across the country, it is still intensified in rural pockets. Researchers, educators, and policymakers need to refocus on the context of access.

Access to technology in the form of devices and a stable internet connection has been found to impact students' academic achievements. The achievement gap could be seriously addressed by how

teachers can design their technology use in a manner that will improve students' academic achievements as stated by their curriculum. What was fascinating in this study was the awareness of the participant teachers of the interplay between their school's access to technology and their students' access to technology and essentially where they stand on the digital divide spectrum, even if they may not use that terminology. Therefore, the teachers may be regarded as partners and not arbitrary elements within the dialogue of the digital divide and how to address the issue of access, keeping student achievement in mind. Additionally, the participant teachers are very well acquainted with their students' families, backgrounds, and technology availability. This, again, is one of the unique features of a rural school, where it offers an environment for building relationships among students, teachers, and staff (Nelson, 2010).

In conclusion, this study sheds fresh light on technology use through the lens of the digital divide. Kindergarten through Grade 12 teachers can take insights from the participants' narratives on how technology can be gainfully used in their classrooms and for their online efforts. Even though teachers within their classrooms contributed to narrowing the second-level digital divide through their mindful instructional practices and technology integration, the pandemic negated such efforts. It moved a vast population of rural and remote students into the throws of the first level digital divide, where they struggled to meet their basic access needs to a device or a reliable internet connection.

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