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Technological and Pedagogical Challenges for Teachers During COVID-19

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Walden University
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Abstract

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by

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MA, Shippensburg University, 1999

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Dissertation Submitted in Partial Fulfillment

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Abstract

Implementation of a national contingency plan to mitigate the effects of a natural disaster or major health crisis for schools in the United States has been a focus of scholars since the polio epidemic in 1916. While examining the impact of the COVID-19 pandemic on education in the United States, researchers demonstrated that online remote instruction was adopted as a temporary answer to school closures, yet teachers were not prepared for this type of teaching. Researchers had yet to identify the technological and pedagogical challenges for teachers who taught remotely during the crises with little distance education experience. The purpose of this qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. Guided by the Obsidian model of distributed learning, 12 K-12 teachers were interviewed on their experience of being mandated to teach remotely during the pandemic. Transcript data was analyzed using in vivo method, a priori, double coding, and constant comparisons. The results of the analysis indicated four key themes that emerged: teacher agency, inequities for traditionally marginalized students, difficulty building relationships, and teacher praxis. A key finding was that online learning absent a technology plan created a disruption to education which resulted in a paradigm shift for teachers requiring increased understanding and targeted use of technology. Results of this study provide key information to inform policy. The findings could lead to positive social change by providing information that could be used to inform professional development focused on assisting K-12 educators in online instruction.

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Dedication

I dedicate this dissertation to all the teachers out there whose passion for improving the lives of young people was tested by the pandemic. This is for those teachers impacted by an abrupt switch to remote instruction with little to no experience. I dedicate this dissertation to those who had turned to soul searching on whether to leave the profession, having had their world completely turned up-side down in a matter of weeks. I dedicate this to those finding the strength to explore uncharted territory to equip themselves with the right pedagogy, practices, and technology, who decided to ride the wave of the pandemic together. I also dedicate this achievement to my two furry companions, Gemma Lee, and Jackson, who were constant reminders to me that I do not need much to determine what is most meaningful in life. Their unconditional love was what I needed during an unprecedented time of self-isolation and very little human interaction. Working on a dissertation can oftentimes feel like a daunting task. I trust my mother is looking down from Heaven and smiling because her life struggles were not in vain. This one's for you, Mom.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

The lack, among education leaders, of prioritizing the potential for a pandemic (Kruger et al., 2018) manifested in the significant disruption to the education system in the United States during COVID-19. According to the research by Laprairie and Hinson (2006), there had been prior attempts to use remote instruction during a widespread disaster affecting schools. Literature on school shutdowns in response to the pandemic showed K-12 schools switching to remote teaching (Ferdig et al., 2020). However, teacher readiness for technological and pedagogical challenges brought on by COVID-19 had been a relatively unexplored topic. My study allowed me to identify and address challenges for teachers' who used massive online platforms and remote instruction in K-12 to navigate the pandemic for more than a school year.

Before COVID-19, many schools in the United States overlooked the implementation of a crisis preparedness, response, or recovery plan in schools (Lister & Stockdale, 2007). When the COVID-19 pandemic shut down schools, the goal became to switch to rapid remote instruction. The gap my study addressed was the limited research on teachers who had to teach online with no training and little experience using massive online platforms and remote instruction, particularly in navigating a pandemic, over an extended period. Downplaying the threat of a pandemic to schools resulted in a shutdown of schools during the COVID-19 pandemic. The response ultimately was like the regional response to education after Hurricane Katrina (Laprairie & Hinson, 2006), which had also resulted in a sudden switch to rapid remote instruction (Kruger et al., 2018). As for COVID-19, the impact of the crisis was global, and the impact on schools was

widespread. At the onset of school closings, initial research on the effect of COVID-19 on teaching and learning revealed that teachers were unprepared and needed just-in-time professional development (JTPD, Ferdig et al., 2020). Many teachers in these studies had no experience or training in remote instruction.

While Barber et al. (2020), CealLaigh et al. (2020), Hartshorne et al. (2020), Statti and Jaafar (2020, June), and Whalen (2020) extensively researched the switch to rapid remote instruction, 12 months into the school shutdowns a gap still existed on the technological and pedagogical challenges for K-12 teachers with little to no training having to teach remotely during COVID-19. According to Archambault et al. (2021), teachers were tasked with new roles as they attempted to remain engaged and connected with students remotely, addressing disparities for previously impacted learners while surviving the impacts themselves. The goal for schools was to fulfill the expectation of a continuation of learning. In the case of COVID-19, it was in the form of an evolving emergency response.

Chapter 1 considers the purpose of studying teachers challenged to teach remotely during a world health crisis. This study aimed to apply Obsidian, a distance learning model grounded in adult learning and need-based training, to understand from K-12 teachers what the technological and pedagogical challenges were when teaching remotely in the United States during the pandemic with little distance education experience. Chapter 1 provides the rationale for addressing the problem statement, the two key research questions, the conceptual framework, the nature of the study, and possible limitations for conducting this type of research. Finally, this chapter ends with

the social implications of this research and the contribution of this study to the discipline of education technology in K-12 online learning.

Background

Online learning has been considered by the International Society for Technology in Education to be vital to the sustainability of education and as a 'fulcrum of change' (Trust, 2017, pp.1-3). As a result of the COVID-19 pandemic, an instructional pivot occurred from the widely used term "remote teaching" to "emergency remote" (Safi et al., 2020). But the apprehension to adopt technology created significant barriers for schools (Christensen & Alexander, 2020; Hamlen, 2020; Laprairie & Hinson, 2006; Woodside, 2020). The federal government published guidelines for public safety and school closings to implement rapid remote instruction in the most effective, efficient, and affordable way (Trust, 2017). Still, planning for a pandemic had not been a priority for many in the education community (Kruger et al., 2018). During the COVID-19 pandemic, the need to immerse teachers in JTPD, as evidenced by the research of Anduvare and Holmner (2020) and Archambault et al. (2021), was proof of the challenges teachers faced leveraging technology and a pedagogical shift to adapt to teaching remotely. Studies like these showed teachers needed to be invested in the learning process in very different ways because of the pandemic.

Twelve months into the school shutdowns, online learning had been extensively researched (Barber et al., 2020; Sanders & Lokey-Vega, 2020; Pittman et al., 2021; Schelling & Mason, 2021). Yet, the question of how K-12 schools met the challenge of continuous learning during a crisis still existed. More importantly, the literature on the

technological and pedagogical challenges for K-12 teachers not trained in providing content and instruction remotely did not exist. Research from Archambault et al. (2021), Barber et al. (2020), Schelling and Mason (2021), and Williamson et al. (2020) indicated that, at first, teachers were not prepared or equipped for emergency remote instruction. Still, they had adopted education and communication tools. Online virtual classes included using Zoom and Google Meet, online learning management systems such as Canvas and Google Classroom, and depositories for resources and student work.

Research by Chambers and Lipscomb (2020, November) described organizational decisions to implement online shell courses and allow teachers to customize the massive open online course (MOOC) with tools and resources to further interest students. These learning management tools and systems were structured courses and resources. Teachers were expected to use these standardized courses and built-in grading features and communication tools embedded in the class. The Chambers and Lipscomb study referred to the inferiority of online learning for some students and teachers as the mitigating factor of online success. They also pointed to the need for structured platforms with learning-communication tools and the impact of not having them on teacher agency. However, according to the research of Barber et al. (2020), the literature on K-12 teacher use of these online platforms and resources was limited.

The U.S. Government's Technical Assistance Center issued the Readiness and Emergency Management for Schools emergency remote guide to support schools with information about the continuity of learning model (REMS Guide, 2017). This guide declared emergency remote teaching (ERT) as critical to school emergency management

as it allowed for continued education and learning during a crisis. The REMS guide outlined the key variables affecting ERT: accessibility, type, quality of resources and instruction, and the length of time to maintain this type of learning. The research of Barber et al. (2020) supported the recommendations made by the REMS guide not to rely on ERT for an extended period but to manage a crisis. In the case of the COVID-19 pandemic, remote instruction continued for more than a year.

Before 2020 (Kruger et al., 2018), due to several failed responses and a lack of preparation for natural disasters and pandemics, the REMS guide strongly recommended schools plan for any future crises which would impact schools. Given the prior warnings about the importance of planning and being prepared for the next major health crisis or natural disaster, when COVID-19 hit the world like a tsunami, the United States was still unprepared. The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. Data of K-12 teachers having to switch to rapid remote instruction and remain online for a full academic year allowed the study to consider the timeline of what was occurring for education across the United States.

Problem Statement

The problem this research addressed was the little understanding of the technological and pedagogical challenges for teachers with little distance education experience who taught remotely during the COVID-19 pandemic. Literature on an overall school response to the pandemic showed K-12 schools choosing to switch to remote

instruction (Ferdig et al., 2020). However, teacher readiness for technological and pedagogical challenges brought on by schoolwide shutdowns, especially during a pandemic, had been a relatively unexplored topic. For many teachers, before school shutdowns, most K-12 schools used face-to-face instruction with computers and learning management systems, focusing on in-school learning (Arnesen et al., 2018). According to studies such as the research of Cançado et al. (2018), on effectiveness of online instruction for students at risk of dropping out of school, remote learning proved to be an alternative route to graduation. The U.S. Department of Education Office of Educational Technology's plan to reimagine technology's role in education declared that distance learning was of benefit to many students who required help to meet individual learning needs (2017 NETP).

During the Spring of 2020 (Reich et al., 2020), 49 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands quickly adopted statutes and regulations to govern how schools would respond to a disease outbreak. A body of research was growing on teaching remotely during a crisis (Baran & AlZoubi, 2020: Carey et al., 2020; Clausen et al., 2020; Ferdig et al., 2020: Reich et al., 2020; Safi et al., 2020). Schools in all 50 states had building closures (see Appendix E), which showed a final count of the number of school closures around the United States in the Spring of 2020 due to the COVID-19 pandemic). As the crisis gripped the country, remote instruction and virtual learning on a massive scale gained accelerated importance.

Because of forced, rapid remote instruction, many teachers received JTPD. Reich et al. (2020) stated that schools were still developing plans. Safi et al. (2020) revisited

prior disasters in which the schoolwide response was to resort to virtual learning and remote instruction. Just like Laprairie and Hinson (2006) reported, it was remote instruction that schools decided upon, just like during hurricane Katrina in 2005. In the case of remote education in regions hit by the hurricane variables such as lack of WIFI, inability to network with families, and the impact of the hurricane on infrastructure were barriers to implementing rapid remote instruction. My study addressed a gap in the literature regarding challenges teachers faced leveraging technology and teaching during the pandemic when many teachers had little to no experience.

Purpose

The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. As the pandemic remained in full force, it continued to bring technological and pedagogical challenges for K-12 teachers. This study focused on the experiences of K-12 educators teaching and learning remotely during the COVID-19 pandemic when many had no experience or training in teaching remotely.

Research Questions

The central research questions for this study were:

Research Question 1 (RQ1): What did K-12 teachers perceive were the technological challenges of teaching remotely during the COVID-19 pandemic?

Research Question 2 (RQ2): What did K-12 teachers perceive were the pedagogical challenges of teaching remotely during the COVID-19 pandemic?

Conceptual Framework

The conceptual framework for this basic qualitative study was distributed learning (Downes 2007b, 2017). The model of distributed learning I used was developed by Obsidian (Victor & Hart, 2016), an organization of instructional designers who create comprehensive learning deliverables for corporate and educational industries. I selected Obsidian distributed learning because of its fundamental use of ADDIE instructional design (Strickland et al., 2013) and social constructivism (Vygotsky, 1978) within a virtual environment in which a pandemic brought on the circumstances. The ADDIE model, applied to the training of many adults on a massive scale (Bundrage & Mapson, 2022), was shown to be successfully achieved at the post-secondary level in the study by Carey et al. (2020) on prescriptive training and to develop of educational websites for language learning (Ghani & Daud, 2018).

Because this study was with K-12 teachers, I focused on the experiences of K-12 educators teaching and learning remotely during the COVID-19 pandemic when many had no experience or training in teaching remotely. I selected the Obsidian use of ADDIE and applied it to the technological and pedagogical challenges for K-12 teachers due to

the urgent need for skills development 'on the fly' for many staff and teachers. I used distributed learning theory to formulate the two key research questions on the challenges for teachers with technology and pedagogy during the pandemic. ADDIE design in the Obsidian model aligned with my study on rapid immersion in technology, the need for massive training, and the urgency of skills development ‘on the fly.’ The application of distributed learning in Obsidian learning combines blended, mobile, and informal learning environments based on cognitive research. The goal of Obsidian distributed learning is to provide interactive training programs as needed, grounded in adult learning theory (Victor & Hart, 2016).

The Obsidian distributed learning model (ODLM) has traditionally been used to train employees with technology to enhance job skills, collaboration, and satisfaction. ODLM focuses on three key factors: the people, the technology, and the experience, and supports the use of discussion space for open interaction to allow for a supportive learning community. A study by Victor and Hart (2016) characterized ODLM as individuals sharing resources and information with which the group's collective knowledge and experience could build social presence and enhance collaboration. Models of distributed learning in an online environment include elements of social constructivism (Vygotsky, 1978), making meaningful connections to an event or experience through contextual understanding, internalizing new knowledge from social interactions, and storing it into long-term memory (Downes, 2017). The fact teachers struggled to adapt teaching pedagogy to fluctuating situations brought on by a pandemic became the basis for my research questions to determine the challenges teachers

experienced while teaching during the pandemic. I will provide a more detailed explanation of distributive learning theory in Chapter 2.

Nature of the Study

Using a basic qualitative study, I compared the experiences of K-12 teachers from around the country, applying the theories of social and distributed learning to a real and present pandemic. It allowed me to derive meaning from an actual real-world crisis and the aggregate experience for teachers. Data in my study represented human thoughts and feelings, even though they are not directly observable. According to Patton (2015), qualitative inquiry uses thematic analysis to accomplish this goal. In the case of my study, gathering data on JTPD, as discussed by Anduvare and Holmner (2020), as well as Archambault et al. (2021), provided the opportunity to fully understand the technological and pedagogical shifts occurring at the time. According to the Obsidian model (Victor & Hart, 2016), information can be accessed and aggregated as a collection of individual responses during group interactions online. Knowledge-building uses web-based tools and resources. My study built upon theories of learning in K-12 and a model of distributed learning as the practices for online instruction within the context of a global pandemic. My research included a preliminary questionnaire for prospective participants to self-determine participation eligibility. In addition, my study detailed the methods for data collection using the following two sources:

1. A Single virtual interview was used with each K-12 teacher.
2. Error checking via follow-up email with each participant was used to validate data interpretation to ensure it matched the participant's experience.

The data were analyzed first in the form of a comparison of transcript data to allow me to capture patterns of words and phrases reflecting similar perspectives on a shared experience. I assigned a code to categories of like responses to allow for further analysis. I analyzed data using the processes of cross coding and double coding methods to find patterns and themes describing what participants, in general, experience relating to each of the research questions. Chapter 4 details the data collection and analysis methods. Chapter 5 discusses the findings of the study. Non-data-collection tools were also used in this study, including reflective journaling and feedback from a trusted Ph.D. colleague, which fostered penetrating reflection.

Definitions

In the context of this study, the following terms were:

Community of inquiry: The community of inquiry model describes successful online learning in higher education as a constructivist process, and for my study, it adapted for use with K-12 online learning environments by schools to mitigate the pandemic (Ferdig et al., 2020; Garrison et al., 2010).

COVID slide: The COVID slide was a title given to a period of significant learning loss due to school closures and the switch to remote instruction in K-12 during the COVID-19 pandemic (Bielinski et al., 2020).

Continuity of learning: The continuation of learning describes the period during school closures when education is continued in some form to remedy prolonged school closure or student absence (Ferdig et al., 2020).

Distance education: Distance education has been defined as using technology to overcome learning barriers due to geographical location (Arneson et al., 2019).

Distributed learning: Distributed learning uses distance education, content and resources, and communications technology to provide a learning environment unrestricted by location or time (Downes, 2017; Victor & Hart, 2016).

'Just-in-time' professional development (JTPD): JTPD was an informal PD offering on the fly support when teachers needed, characterized as flexible and responsive, and unrestricted by time or location (Hartshorne et al., 2020).

Assumptions

As the COVID-19 pandemic remained in full force, it brought technological and pedagogical challenges for K-12 teachers as they taught remotely during the pandemic. An assumption was that most teachers experienced the switch to rapid remote instruction similarly, and all experienced JTPD. Yet, participants approached learning 'on the fly' from various levels of prior knowledge and training in teaching online using virtual instruction. Additionally, an assumption was made that the inclusion criteria assured the participants had similar experiences of the same phenomenon. Another assumption for this basic qualitative study was the participants would provide honest answers to interview questions. An additional assumption was the participants had a sincere interest in the purpose of my research and wanted to invest in a study that would benefit the profession.

Scope and Delimitations

The scope of the study was not limited to a geographical location but defined by the ability to conduct single, semi structured, online interviews with 12 K-12 teachers in a variety of school settings around the United States to collect rich data that would allow me to generalize to a larger population of K-12 teachers. The conceptual framework, a distributed learning model, was used to address the lack of attention given to two areas that became the focus of my key research questions: the technological and pedagogical challenges for teachers who taught remotely during the COVID-19 pandemic and who had little to no prior experience. The ODLM was used because it supported massive online training as needed to remedy urgent demands for a skilled workforce. Teacher data were analyzed and double coded for connections between technological and pedagogical decisions. A factor that proved crucial to the analysis was the timeline of the pandemic and participant responses. The results of my study provide critical information for teacher educators, teachers, and administrators. It has the potential to inform policy and support further research on distance learning. My findings may help to redefine online instruction for K-12 education in the United States. Further research may look at the usefulness of frameworks like the ODLM to support K-12 continuity of teacher preparation by focusing on teacher supports and training to improve student engagement in an online environment.

Due to the nature of conducting a study during the pandemic, my study was not limited to geographical location. As for this study, one delimitation was the experiences of teachers teaching remotely online during the pandemic with varying degrees of

expertise. Another delimitation was the participant size of 12, which made the study more feasible. Another delimitation was that since teachers were initially mandated to teach remotely and had varying degrees of online experience and training, having little knowledge of how to teach online impacted teacher perceptions, which ultimately influenced the decisions they made on technology adoption.

Limitations

This study's limitations included several conditions unique to qualitative inquiry and the use of an in-depth virtual interview approach (Yin, 2017). Another limitation was that I was also a teacher, having to teach remotely, and my background included being an online instructor. Therefore, biases I may have had were at risk of influencing data collection, analysis, and interpretation (Patton, 2015). Consequently, I remained aware of this, used the interview questions for focus, and included error checking. I journaled and discussed commonalities and themes in data with a trusted colleague. Aspects of the study involved the purposeful inclusion of certified teachers with varying cultural and language backgrounds teaching K-12 subjects online.

The focus of this study was to apply Obsidian, a distance learning model grounded in adult learning and need-based training, to understand from K-12 teachers what the technological and pedagogical challenges were teaching remotely in the United States during the COVID-19 pandemic with little distance education experience. Aspects of the study involved the purposeful inclusion of certified teachers with varying cultural and language backgrounds teaching K-12 subjects online. Teachers had a choice to use Zoom or Google meet for the interview. Additionally, using qualitative data analysis

software may have presented another limitation. Using software in data analysis can limit research bias, but, according to Yin (2017), it introduces rigidity in data collection and analysis. However, hand coding would have been more time-consuming, so I used coding software. Transferability was an essential consideration for my study. I also needed a research methodology that supported my work on a dependable study. Detailed notes were kept providing context for the study. For dependability, the research purpose, instrumentation, and participant data were peer reviewed by colleagues who had completed a rigorous doctoral process in the same field. In addition, I sought feedback from my dissertation committee members during each phase of the study.

Significance

The data collected in this study was used to uncover themes of technological and pedagogical challenges for K-12 teachers in the United States as they taught remotely during the COVID-19 pandemic. A potential contribution of this study to the discipline of education technology and K-12 online learning was the collective experience of teachers around the country and the technological and pedagogical challenges of teaching remotely as the result of a pandemic for the following: the rapid remote factor, prior experience and training, the timeline of the pandemic, interactions with students and teachers, and new teaching pedagogy. The results of my study can potentially assist schools in considering remote instruction as a viable technology-based form of content delivery to meet the needs of students who would benefit from this kind of delivery. The results of my study can be added to a recent compilation of research on pre-and post-COVID-19 distance education and become instrumental in what Johnson et al. (2022)

wrote will "assist policymakers, researchers, teacher educators, teachers, and administrators in informing decisions on policy and K-12 practice" (p. 36). My findings may help to support further research on distance learning to redefine online learning for K-12 education in the United States.

Further research may want to look at the usefulness of frameworks like community of learning (CoL) and the Obsidian learning model to support K-12 continuity of learning and teacher preparation which was not given adequate attention due to the urgency created by the pandemic. Implementation of systemic change takes time. Because of the unprecedented shut down of schools and immersion in remote instruction, there was no time for a plan to implement such models. As a result of my research, further research may benefit the field by focusing on teacher support and training to improve student engagement in an online environment. Other studies can show ways to prepare and assist teachers in navigating school closures, and to view distance education as another tool in the teacher toolbox.

This study provided additional research on previous blended and online learning models, which would not have proven to be a good fit for some teachers (Williamson et al., 2020; Woodside, 2020) during forced rapid remote instruction. This study provides research on those who were not experienced or trained in remote education using a virtual learning environment. According to Talidong and Toquero (2020), many classroom teachers had little experience teaching online before massive shutdowns due to the pandemic. Factors related to this were the lack of education and training and perhaps the teacher's preference for face-to-face (Ma et al., 2018). This had affected the technology

adoption rate (Office of Educational Technology, 2017). The results of this study added to the literature on technological and pedagogical hurdles teachers faced with their own instructional needs during a pandemic, especially when the requirement for meeting the needs of students with special accommodations were involved (Brewer & Cartegena, 2020).

The results of my study were significant in finding out what interactions with people, technology, and JTPD (Hartshorne et al., 2020) used during COVID-19 were worth investigating further in preparation for future pandemics. My study addressed positive social change by showing the following themes in the challenges teachers had with remote instruction with little experience: teacher agency; struggles with building relationships with students online during the pandemic; inequities (Kaufman & Diliberti, 2021) in remote teaching involving socioeconomics, culture, and race; and the length of time needed to teacher remotely and the development of teacher praxis. The pandemic brought schools to the intersection of many existing challenges and the magnification of them due to the global crisis. Understanding these needs must be met in a virtual and face-to-face environment with teachers well trained in social learning.

The study's findings may provide K-12 school administrators, curriculum developers, school staff development professionals, and teacher preparation programs with evidence of what teachers perceived were effective or least practical regarding professional development and the use of technology, and what was helpful during the crisis. It may be a more widely accepted modality post pandemic and beyond. Conducting my study during the pandemic has allowed me to propose that consideration

be made to the emotional wellbeing of teachers, how to engage reluctant adult learners, and to the further development of online pedagogy for user-friendly virtual training for teachers.

Summary

The pandemic was a concern for schools around the country, with some areas more impacted than others. To mitigate the impact of school closings due to the virus the following school year (Miller et al., 2021; Nelson et al., 2021; Opalka & Lollo, 2021), and to address learning loss due to the pandemic, many school districts designed hybrid and virtual summer programs and learning placement options to give students a choice to have face-to-face or continue learning online (Beck & Beasley, 2021; Black et al., 2021; Marcolini et al., 2021). Hope for the future had been to be in-person learning; however, educational institutions have also created innovative and flexible learning options (Huck & Zhang, 2021). Data collected in this study were used to understand the technological and pedagogical challenges for K-12 teachers as they taught remotely during the COVID-19 pandemic.

The results of this study could assist school leaders in being better prepared to provide options for content delivery. Using this information on how the challenges were tough for teachers could potentially inform teacher preparation programs and make considerations for distance learning better. Further findings can be used to prepare future teachers with skills and best practices to teach online with school districts now offering families flexibility and choice at every grade level to meet the needs of student in all situations. Learning during COVID-19 helped to enhance technology use and deliver

content rich and engaging learning opportunities for students who benefit from remote instruction.

Chapter 2 describes the conceptual frameworks I selected for my study and strategies I used for an extensive review of the literature on teaching remoting during the COVID-19 pandemic. The frameworks supporting distributed learning and social constructivism are outlined in detail in Chapter 2 because they are connected to how ODLM considered existing models of engagement: creating a social presence, collaboration, networking, and having an investment in research infrastructure.

Chapter 2: Literature Review

The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. Prior literature considering the timeline of teaching remotely during the pandemic included Baran and AlZoubi (2020), Carey et al. (2020), Ferdig et al. (2020), Huck and Zhang (2020), Meritt and Wertzberger (2020), Neumann and Smith (2020), Plante and Palmer (2020), Whalen (2020), and Williamson and Potter (2020). These studies revealed a growing body of evidence of teachers' saying they were overwhelmed. Furthermore, studies like the Kaufman and Diliberti (2021) study reported that many teachers admittedly were unprepared to use remote teaching strategies when school closings first occurred in the Spring of 2020. Results of studies by Smith (2020) and Woodside (2020) showed teachers struggled to add online teaching pedagogy due to the challenge of being immersed in technology to navigate a pandemic.

In Chapter 2, a review of the literature shows technology pedagogy already existed in face-to-face and blended learning, as did a solid practice in the use of technology for collaborative learning as evidenced in an online community of engagement (Borup et al., 2020), in the TPACK model, with MOOCs, in a community of practice (CoP), a community of inquiry (CoI), with human centered design (HCD), as well as with project-based learning (PBL) and universal design (UD). Literature review during the pandemic showed such models were foundational to ODLM. Chapter 2 shows these frameworks characterize collective members as having an online social presence,

sharing resources and ideas, and demonstrating creative thinking and collaboration. The group focuses on problem solving, participatory research, empathy, research-based conversation, networking, and the investment in research infrastructure which are hallmarks of the ODLM.

As the pandemic remained in full force, it continued to bring technological and pedagogical challenges for K-12 teachers. Whalen (2020) showed the increasing measures schools needed to take to adopt an all-hands-on-deck approach to connect with students and families using massive online learning networks. The research of Borup et al. (2020), Beck and Beasley (2021), and Ferdig et al. (2020) regarding the challenges faced by leveraging technology and teaching remotely during a pandemic created a backdrop for my study. Limited research was available on pandemic induced rapid remote instruction in K-12 and the technological and pedagogical challenges for teachers as they taught remotely (Archambault et al., 2021). Many teachers had little experience, limited training (Imants & Van der Wal, 2020), and little desire to leave the classroom to become virtual teachers before the pandemic. My research questions focused on what challenges K-12 teachers in the United States experienced while teaching remotely during the pandemic remotely (Baumgartner & Ferdig, 2019; Beck & Beasley, 2021).

Chapter 2 addresses an application of essential tenets of K-12 pedagogy and adults as learners to manage better professional development for veteran teachers, new teachers, and teacher candidates prepared for virtual delivery during a global pandemic. This chapter also covers what the literature revealed as factors for eLearning success: a community of support and engagement, human-centered focus, learning through

immersion, meeting the learners where they are, social emotional learning, authentic learning opportunities, maintaining a focus on pedagogy, and infusing easy access to online educational resources (OER) with sustainable professional development, supported by solid research infrastructure.

Chapter 2 combines widely studied theoretical frameworks of K-12 learning with models of teaching to trauma (Carver, 2020; Statti & Jaafar, 2020) and social emotional learning (Borup et al., 2020) to meet the students where they were (Bielinski et al., 2020). This chapter includes attention to the following primary features common to distributed learning: shared learning experiences, the networking of people, and informed use of technology. This chapter covers distributed learning (Bonk et al., 2018; Downes, 2017), distributed learning during a crisis (Carter, 2009), and ODLM (Victor & Hart, 2016).

Studies conducted throughout the pandemic showed the uses of online learning management systems and open education resources (Chambers & Lipscomb, 2020) as well as pedagogical adaptation based on a CoI and CoP model (Miller et al., 2020) and the attempts to address the challenges leveraging technology and pedagogy with remote instruction. Early research suggested many variables impacted remote learning and teaching success, including the devastation the pandemic had on peoples' lives (Hartshorne et al., 2020). Forced immersion in remote instruction and the use of JTPD for crisis management (Hamlen, 2020; Whalen (2020), although largely unsuccessful in the first 6 months of the pandemic (Barber et al., 2020), eventually led to accelerated adoption of online learning pedagogy (Beck & Beasley, 2021; Hamlen, 2020; Kaufman & Diliberti, 2021).

Literature Search Strategy

I used Walden University's Thoreau Library to access databases used to conduct an initial literature review. Those I selected first included Academic Search Complete and Education Resource Complete. Added to the process were SAGE publications and the Walden Dissertation Database. Later I performed more targeted searches in Thoreau Multiple Databases via Advanced Search EBSCOhost, followed by a review of literature in repositories accessed by becoming a member of professional organizations and special interest groups. The process began with a review of peer-reviewed literature by abstract and study brief to gain insight into the methodology used, conclusions, limitations, and delimitation of the study. Employing this method of using key terms addressing my research questions and selecting research less than 5 years old at the time of my search allowed full text access to existing research and the citations and references from these primary sources. Peer-reviewed literature was mined in online scholarly journal databases and by Google Scholar. Once I categorized research according to topic and research methodology, I analyzed trends in study topics, methods, conclusions, and limitations.

I conducted a second search of the literature from April through May 2020 (Archambault et al., 2021; Brieger et al., 2020; Clausen et al., 2020; Ferdig et al., 2020; Hartshorne et al., 2020; Huck & Zhang, 2021; Nelson et al., 2021; Webb et al., 2021; Williamson et al., 2020), as the COVID-19 phenomenon unfolded. Adding the terms *COVID-19, rapid remote learning or rapid remote instruction*, *K-12 education*, *and teacher preparation* related to the topic, and by source and citation, yielded additional recent journal publications. Saturation of the literature showed gaps in research on

teacher preparation for online instruction, concrete plans for implementing instruction during a pandemic, and challenges of leveraging technology and instructional pedagogy while dealing with all other personal, economic, and social impacts of teaching during a pandemic.

Because the literature review focused on K-12 online learning in response to COVID-19 while the crisis was occurring, it was initially challenging to find peer-reviewed, published work in journals. As the pandemic progressed, a third search included a growing body of literature uncovered in white papers, conference presentations, action-research documents, and shared studies conducted at universities around the United States. Experts and scholars shared the research data and related literature with the academic community. I directed the literature to scholarly, peer-reviewed journals. I employed Google Scholar to find the accessibility of the current literature that was crosschecked and peer reviewed.

Because of the limited number of results from the initial searches in April and May 2020 with the terms *MOOCs*, *commercial online learning platforms, and learning management systems*, I later added *synchronous learning* in both *K-12* and *adult learning*, the search terms *rapid remote*, *COVID-19*, and *K-12*. Using these additional search terms, in addition to the progression of the pandemic, I identified international articles posing challenges to the scope of this study (Agarwal & Kaushik, 2020; Basilaia & Kvavadze, 2020; Mastrogiacomi, 2020). With the help of the research librarian and my participation in an online workshop hosted by Walden Library, I decided to include an internet-wide search engine in my literature review.

This collaboration proved very effective and allowed me to focus the literature review process by funneling from general to specific, international to within the United States and aligning the research review results with the study. Google Scholar gave way to accessing additional databases and a plethora of scholarly articles on the Internet. Using Google Scholar - *peer reviewed*, using the same parameters as previously stated, returned thousands of matches. A downside to using Google Scholar was it resulted in returns of loosely related studies requiring manual vetting for academically rigorous material appropriate for my research. When I narrowed the search, my review began to point to noticeable gaps in the literature about teachers who taught remotely during COVID-19.

I conducted a third search and literature review in the Summer of 2020 (Loewenberg, 2020; Santos & Lokey-Vega, 2020: Shonefield et al., 2020; Statti & Jaafar, 2020; Woodside, 2020). I excluded studies not focused on K-12 rapid remote online learning. I explored reference lists from K-12 rapid remote online learning and teaching during the pandemic. Joining professional associations allowed for access to additional resources from the repositories of professional organizations such as Journal Online Learning Research (see https://www.aace.org/pubs/jolr/), LearnTech Library (see https://www.learntechlib.org/) and the K-Online and Blended Learning Clearinghouse (see http://k12onlineresearch.org/). I funneled further searches to studies more closely aligned with the design of my proposed study.

Additionally, supporting literature giving a historical perspective on the impact of a pandemic on schools and evidence of prior planning was included. I searched resources

from a compilation of federal and state planning guides and guidelines published by the National Standards for Quality Online Learning (iNACOL, 2020). I reviewed the standards from the International Society of Technology and Education (ISTE) and the Society for Information Technology and Teacher Education (SITE, see http://site.aace.org/sigs/k12-online-learning-sig/). I also examined the Research for Better Teaching (RBT) and the American Educational Research Association (AERA) publications. Studies on navigating a pandemic as public health crisis were vetted via the American Journal of Public Health (AJPH), the World Health Organization (WHO), and the Department of Health and Human Services, Center for Disease Control and Prevention (CDC).

It became evident during the literature search process that was revising search terms and limiters was necessary to find additional articles. This revision occurred three times as very few articles on the pandemic were initially returned. Once I added the terms *COVID-19*, *rapid remote learning* or *rapid remote instruction*, and *K-12 education* and *teacher preparation*, it produced slightly larger results. In five weeks, this resulted in 100 additional results (Furuta et al., 2020; Jernigan, 2020; Jester et al., 2020; Reich et al., 2020; Statti & Jaafar, 2020; Whalen, 2020). Another term used was *distance education*, yielding 34,281 results. To eliminate postsecondary studies, I narrowed the search results using limiters K-12 or *middle* or *high school students*, NOT higher. Out of the 1120 studies, I found only 12 studies that were relevant to my proposed research and pointed to a noticeable gap in the literature.

A fourth literature review was conducted in the early fall of 2020 using the same process, targeting the same sources. A growing body of literature supported the COP framework and now includes more literature on teacher adoption of technology during the pandemic. Studies by Miller et al., 2021, Reich et al., 2020, and Webb et al., 2021, were mined after schools had utilized the summer of 2021 to provide virtual summer programs to address learning loss for students. Additional studies, such as the research of Beck and Beasley, 2021, Borup et al., 2020, and Clausen et al., 2020, provided timely accounts of what led to the formation of virtual academies for families who wanted to remain the following school year.

The COP model became a standard in schools (Miller et al., 2021) and was adopted and implemented by state education agencies as remote learning guidance (Reich et al., 2020). By the fall of the 2021 school year, students switched back to face-to-face, and others entered newly created virtual schools and online courses provided by the school district and connected to a local school. Research (Barber et al., 2020) supported the new decisions and the shift in school priorities (CealLaigh, 2020). The recommendations from the study of Opalka and Lollo (2020) also emphasized the continuum of support for students, which should continue far beyond the pandemic. Schelling and Mason (2021) reminded teachers to take lessons learned from the pandemic to welcome new knowledgebases, including child well-being, technical knowledge, and a new pedagogy for teaching.

Conceptual Framework

Distributed learning was an ideal conceptual framework for this basic qualitative study (Downes, 2007b, 2017; Carter, 2009). Distributed learning has been applied to this study on the technological and pedagogical challenges for K-12 teachers teaching remotely during the COVID-19 pandemic. Obsidian, an adult education model of DL (Victor & Hart, 2016), allowed me to focus on three key factors: the people, the technology, and the experience. The foundation for Obsidian is the ADDIE instructional design (Bundrage & Mapson, 2020), applied to teach online. Florida State University created the ADDIE model for the military in the 1970s (Strickland et al., 2013). ADDIE stands for stages of instructional design, of which the four key stages of analysis: design, development, implementation of an evaluation guide developing training and instructional materials. Since its inception, the ADDIE model has been revised several times to use interactive media and dynamic tools and resources increasingly.

Vector and Hart (2016) characterized Obsidian learning as individuals sharing resources and information with the group, building g social presence, and enhancing collaboration through the group's collective knowledge and experience. Obsidian follows the ADDIE model of rapid instructional design, which made it helpful for this study of teachers across the country who had to adjust and perform in a global pandemic as they were mandated to teach remotely, some with little to no experience. Research on distributed learning with various models, including the Obsidian model (Downes, 2017), grows as technology in education grows. As technology evolves, as it

has with the use of online learning management systems or LMSs (Piña, 2013; Borup et al., 2019; Hamlen, 2020), the Obsidian model continues to be used widely in the eLearning industry (Alfaro et al., 2021).

The purpose of the study aligned with Obsidian model because the model focuses on the use of need based on the fly professional development, which involves a conscious effort to use technology to create centers of space to disseminate knowledge and content while promoting open interaction to foster shared learning. At the same time, the model encourages the use of technology for individual access to resources and information. Collective knowledge builds a sense of social presence. The collaboration occurs as part of the shared experience.

The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. Fournier and Kop (2015) used distributed learning framework with a learning management system to highlight the ease of using interrelated features (e.g., open education resources) within the LMS to foster a personal experience in a cooperative learning environment. Massive online courses, or MOOCs, are interactive learning environments that offer a more interactive learning experience that can include synchronous and asynchronous activities (Siemens, 2013). In a study on massive online courses (Bonk et al., 2018), the focus was the responsibility of the learning institution and its members to lean into a participatory learning experience.

Distributed Learning

Distributed learning (Downes, 2007b, 2017) posits that distributed knowledge is accomplished through a network of connections in which individuals construct meaning through interactions. Meaningful relationships can occur within internal and external networks that comprise the framework for distributed learning. I could generalize and say the study suggested an aggregate experience of K-12 teachers who had to teach remotely during the pandemic with little to no prior experience. This study of K-12 teachers in the United States considered a network of people, technology, and experiences associated with immersion in the online learning modality of instruction. DL considers critical factors of meaningful interactions are people, technology, and shared experience. These factors are essential to Vygotsky's social constructivist theory (Armstrong, 2015; Vygotsky, 1978) of social learning. Vygotsky's approach has been widely respected and remains seminal to today's online learning and instruction pedagogy, including online learning and connectivism in distance education (Downes, 2007b). Constructivism provides the foundation for further exploration of distributed learning and the Obsidian learning model. The results of this study will contribute to future studies of online learning and distance education within the K-12 setting in response to a pandemic.

Obsidian Learning Model

In the Obsidian model, measuring one's ability to connect with others in a professional learning network (PLN) involves meeting them where they are in terms of job skills and attitude and providing the needed support, resources, and training. Gerdeman et al. (2018) say purposeful professional development improves instructional

effectiveness. Before the pandemic, school districts made a continuous effort to provide innovative and meaningful ways to support teachers. As the pandemic progressed, online professional learning networks for teachers became a mechanism to support professional development. As for my study, technology, a learning management system (LMS), and social networking technologies were used by teachers. Selecting a model of distributed learning appropriate for adult participants, the teachers showed an aggregate knowledge of adult teachers and administrators in a K-12 setting (Bonk et al., 2018; Victor & Hart, 2016). Interactions of a social network and shared experiences helped to create new knowledge (Vygotsky, 1978) and occurred during the implementation of online learning due to the pandemic.

Instead of considering technology as 'the network,' the Obsidian model considers the networking of people and technology as the effect of immersion experiences and the sum-total of the incidents in remote learning (Archambault et al., 2021; Garrison et al., 2010; Safi et al., 2020) and interactive learning. According to Victor and Hart (2016), the Obsidian model refers to "distributed learning" that blends a combination of instructional learning technologies on a massive scale for a specified period. This includes just-in-time professional development because it would occur when needed and focused on competency measures, not knowledge). The Obsidian model, used by the Obsidian Learning Company, was first established in 1998. Fortune 500 companies have used it for training and professional development. However, Obsidian is ideal for e-learning in general. According to the Obsidian model, the focus on using technology for optimum

knowledge management encompasses ingenuity to gain the most out of knowledge resources.

In Anduvare and Holmner's (2020) study, the focus was on using a learning management system (LMS) during rapid remote instruction. Included in the design of the course using an LMS were open educational resources (OERs). The plan involved the CoP model, which supported professional development (PD) and professional learning networks. The authors provide how these technologies were used to enhance the learning experience. Leacock and Warrican (2020) said a CoP was valuable to promoting organizational knowledge through a network of sharing and communication. Their study emphasized the distributed learning model in K-12 to support teachers. If properly implemented, the CoP model promotes openness to new pedagogies. It would allow educators and leaders to observe the implementation of change, identify areas needing further training, and offer guidance to one another throughout the process. Social networking technologies such as Twitter, Facebook, Instagram, and web pages are user centered. By sharing information within these collaboration networks, the user is an active member of the CoP.

A study by Leacock and Warrican (2020) explored Group Facebook and Twitter pages as part of school platforms to interact and interact using web-conferencing by instructional learning teams, escape rooms, and maker spaces. Interaction within the various maker spaces was similar. All were problem solving focused; however, some offered web-based training (WBT), a synchronous exchange. Others chose to offer asynchronous via eLearning platforms, access at will approach. Both WBT and

eLearning included video tutorials or simulations and interactive components. The study looked at the sudden immersion in the online learning platform, considering key factors of the interactions - people, technology, and the shared experience.

Social Constructivism Application to Virtual Learning

My study involved teachers of K-12 students for Vygotsky's social constructivist theory (1978), which states for an individual to make meaningful connections to events, he must rely on social interactions and personal experiences, internalizing interactions with people and events. Key to the successful use of the Obsidian model is differentiation and an ability to understand the learner's needs and show learners acquire knowledge from each other by co-constructing learning (Vygotsky). Because my study is of K-12 teachers in the United States, it will focus on the experiences of K-12 educators having to teach students remotely and participate in just in time PD remotely during the COVID-19 pandemic. The concept of distributed learning and virtual learning aligned with the framework for my study of K-12 teachers when a quick decision had to be made to use either an LMS or a combination of MOOC/LMS.

My study, like others on rapid remote instruction during the pandemic, considered teachers' experiences during the COVID-19 pandemic (Borup et al., 2020; Ferdig et al., 2020; Heinrich et al.,2020) and have had limited training or experience. This study was about K-12 teachers in the United States immersed in remote instruction for a full academic year when many lacked the necessary training to teach remotely. Distributed learning model focused on technology and characterized by individuals sharing information so individuals of the collective can experience a social presence and

collaboration (Vector & Hart, 2016). The social constructivist theory states for individuals to make meaningful connections to the events and things around them they must rely on context, internalizing interactions with people, and processing the events (Downes, 2017).

The methodology for this essential qualitative study included using a virtual interview data collection strategy, researcher journaling for ongoing reflection, and peer feedback to mitigate research bias. The research questions (see chapter 1) relate to the existing theory as participants could rely on context, internalize interactions with people, and process the events (Downes, 2017). As outlined in chapter 2, distributed learning requires the members of a collective learning experience to have an online social presence, share resources and ideas, have empathy, and network with the goal of investing in infrastructure, a CoI, and a CoP. These are hallmarks of the Obsidian distributed learning model (Victor & Hart, 2016).

Literature Review Related to Key Variables and Concepts

The literature review for this study included new studies as the pandemic commenced and schools closed. I focused on a literature mined from a corpus of peer-reviewed journal articles on teaching during the COVID-19 pandemic. This chapter explains the approach to the literature search by bridging the modality of rapid remote instruction and online learning together. A wide net of the existing literature yielded results of online teaching, distributed learning, virtual education, and the challenges of rapid remote instruction due to a pandemic.

Due to an interest in a framework beneficial to a study with teachers, distributed learning was the preferred model for this study as it may be possible to transfer the results of this study to the development of teachers and staff. This study has added to the literature on technological and pedagogical challenges for K-12 teachers teaching remotely during school closures brought on by a pandemic. This study considered the experiences and understandings of the people, the technology use, and the experience of implementing a comprehensive district plan of virtual instruction during a pandemic when preparing teachers. The chapter covers a widely discussed approach used by teacher educators, the CoI Framework (Archambault et al., 2021; Borup et al., 2021; Ferdig et al., 2020; Garrison et al., 2010; Safi et al., 2020).

Because my study was of K-12 teachers, it focused on the experiences of K-12 educators teaching remotely during the COVID-19 pandemic. My research casted the broad net on the literature review to include all levels of K-12 teachers in the United States who switched to virtual instruction to increase the scope and context of learning remotely during a pandemic. Like a study by Whalen (2020) focusing on K-12 educators' training in the form of JTPD development, my research covered the use of emergency remote instruction for a full school year. The Whalen (2020) study also focused on technological and pedagogical challenges for K-12 teachers as they prepared and learned remotely during the COVID-19 pandemic as well as highlighting the gaps in the literature on the focus group. The study concluded that it was a lead teacher, knowledgeable about education and communication technology, who helped the content specialist with the teachers who had questions and needed guidance. This collaboration contributed to the

CoP. Having a trusted colleague to reach out to help struggling teachers alleviated fears and frustrations and be more open to adopting technology.

A literature review on education technology before the pandemic showed the uses of online learning management systems and open education resources within a CoI and CoP (Hamlen et al., 2020); the community is primarily the classroom. Attempts to address the challenges educators faced leveraging technology and pedagogy with technology use within the school were minimal compared to technology use during the COVID-19 pandemic (Gibson & Ochoa, 2019; Heinrich, 2019; Holder & Mills, 2020; Kaufman & Diliberti, 2021). The authors present the historical perspective on the need to adopt and evolve education pedagogy to meet the field's and society's demands. My study focused on K-12 educators having to participate in JTPD remotely during the pandemic. A literature review of this topic considered teachers having to switch to virtual instruction with little to no prior training. I casted an even wider net to saturate the literature in the scope and context of teachers who served as knowledge facilitators and learners. Leveraging technology for teachers during the pandemic presented challenges; thus, the literature review covered the challenges of remote instruction for teachers.

In the study by Victor and Hart (2016) of adult virtual training in a corporate setting, the researchers wanted to determine what mode of delivery in staff development training would best serve the individuals using an online platform with no limitations of access - no restraints of location or time. The Victor and Hart (2016) study aligned with my current study as my study involved gathering data from teachers on technological and pedagogical challenges they had during the pandemic, immersed in rapid remote

instruction. My essential qualitative study aimed to apply Obsidian, a distance learning model grounded in adult learning and need-based training, to understand from K-12 teachers what the technological and pedagogical challenges were teaching remotely in the United States during the COVID-19 pandemic with little distance education experience. In addition, Obsidian learning and the ability to establish social presence, as outlined in the study, aligned with my addressing pedagogical challenges teachers had with giving all learners, no matter their location, a sense of social presence.

The study by Anduvare and Holmner (2020), conducted before the COVID-19 pandemic, related to the purpose of the current research as both considered teachers' prior knowledge of how to use the technology and leverage it with teaching pedagogy for success. Anduvare and Holmner explored technologies that enhanced knowledge management. The study's findings confirm research-based practices focused on informal knowledge management and recommended technologies that expedite such processes. Due to the nature of decisions to adopt technology in the current study, the availability of technology itself was initially a focus for implementation. The recent study considered the K-12 teacher experiences and reported interactions with technology, as well as the availability of technology itself.

In an earlier study by Bonk et al. (2018), 152 university faculty personalizing a massive online course, or MOOC, to leverage online tools and resources led to student success. This study related to studies using MOOC model because teachers used either an LMS or a combination of MOOC/LMS to distribute learning. The findings of the Bonk study showed the teacher's effort to personalize the MOOC was a critical factor for adult

learners online. The other vital factors included multimedia elements and mobile applications, flexible deadlines, alternatives to course assignments, and allowing for guest speakers. The teacher personalized the online course.

Pre-COVID Technological Challenges of Remote Instruction

Before COVID-19, when deciding to research the adoption of remote instruction, one had to consider not only the research showing the benefits of online learning but also the research documenting how to address a technology integration preparation gap. Research by Mann et al. (2019) evaluated a teacher preparation initiative, including the type of support teacher educators received. The study examined how participation in online staff development changed teacher technology integration practices. Factors the study addressed were whether the DL model supported demographic and cultural differences and how it addressed individual learning challenges. In the findings, they described what helped success for the teachers as learners. In the Mann et al. (2019) study, factors that were determined as keys to success were fostering trusting relationships, situated learning course design, using strategies supported by research, and technology integration that positively impacted skill sets and mindsets.

Leading up to my study, a growing body of research like the Mann et., al (2019) study, an evidentiary survey of the success of online platforms in improving learner outcomes, and research of Trust (2017, p.1-3), Kwon (2019), and Ma et al. (2018) validated a need to prioritize individual needs of the online learner to encourage progress with eLearning. Highlighted during the pandemic was the need to use technology that could enhance engagement and improve learner outcomes (Ferdig et al., 2020).

Pre-COVID Pedagogical Challenges Outside the United States

Research of K-12 online teachers before the pandemic included a focus on education technology pedagogy as part of blended learning opportunities keeping human interaction as the cornerstone for student success (Brieger et al., 2020). A study by Gomez (2020) supported using online platforms as an alternative to benefit marginalized students who are not successful in a classroom. In both cases, key elements emerged: managing student behaviors through rigorous yet meaningful content, multiple means of interacting and collaborating, regular feedback and ongoing checks for understanding, and accommodating students where they were in the learning.

A significant consideration for research in the field before COVID-19 was the Technological Pedagogical and Content Knowledge (TPACK) model (Mishra, 2019) and whether to upgrade the pedagogical model to align with necessary curriculum standards. The TPACK Model added to Shulman's Pedagogical and Content Knowledge framework (PCK) (1986) to show how the development of professional knowledge of teachers can be impacted in a positive way using digital technologies. Initially, the growing concern in the field was the focus on technology without the pedagogical decisions on how students learn best, as outlined by Gibson and Ochoa (2019). Since the COVID-19 pandemic shifted the importance of technology use and the need to implement technology due to massive school closings, it relates to the study's purpose to discover what technological and pedagogical challenges existed while teaching remotely during the pandemic.

COVID-19 (First 3 Months) Technological Challenges Addressed

In many studies during the COVID-19 pandemic the teachers were also learners, and immersion of technology by the teacher/learner informed the literature. A study by Baumgartner and Ferdig (2019) surveyed teachers use of simulations and how they could assist in developing skills. Those engaged were preservice teachers (PSTs) who had been using hands-on experience to incorporate technology in their classrooms. The purpose of my study aligns with the results of this study that hands-on experience with technology encourages reflection in the application of activities used in an online class. A study by Jin and Pimental (2020) showed how remote labs assisted in training preservice teachers how to teach physics and engineering remotely yielded positive results, although settings were limited. Instead of using hands-on physical devices, this study explored virtual simulations. In the Jin and Pimental study, video recordings were used to enhance the development of teachers through Zoom meetings in the context of online platforms. The videos were categorized and resourced for professional development to support teachers' reflection on their actions and choices of practice.

A study by Meritt and Wertzberger (published in Ferdig et al., 2020) on leveraging technology during professional development (PD) in a virtual learning environment addressed the learner's emotional needs, using 30-minute, weekly PD. The study used a live show format to engage "active processing." The goal of this DL model was to promote engagement in teacher training through active learning strategies that considered the COVID-19 impact on student teachers. Results of the study showed that using a course designed with elements of live streaming addressed the emotional needs of

preservice teachers. Real-time, active engagement, and authentic learning experiences deepened the understanding of content. It validated and supported the learner with real-time interaction and ongoing communication.

The study by Amador et al. (2020), focusing on equity issues in teacher preparation courses, found that providing high-quality images of teaching scenarios during online activity in professional development methods courses deepened an understanding of teaching practices through reviewing and reflecting. The teacher trainees had access to structured videos and capture sheets with guiding questions in the online teaching lab. The researchers noted that staff development specialists "intentionally planned when to pause a video" (Amador, 2020, p. 808.) which provided an opportunity for teachers to "anticipate productive teacher actions" (p. 810) to compare what they initially proposed were appropriate teaching choices to actual choices. This reflective process promoted productive discussion of how teacher choices impact student thinking and provided space to focus participants' reflections on progress toward instructional goals. It was a way of delivering scaffolded activities to meet the teacher-learners where they were in their level of teaching, teacher prep, and teaching online, notwithstanding they were experiencing the pandemic.

Another study by Koehler and Farmer (2020) showed pre-K to 12th grade teachers navigated the pandemic by switching to online learning. The study examined a CoP model, sampling 104 participants that included parents, elementary and secondary teachers, and administrators who completed a survey to find out what the challenges were in deciding on online learning modules to meet the needs of in-service and preservice

teachers. The data provided information to make decisions on what to include in the eLearning modules to inform and better prepare teachers for both the hurdles and highlights of good teaching in the online environment.

Studies like the one by Neuman and Durst Smith (published by Ferdig et al., 2020) detailed how JTPD had offered teachers ongoing support to teach online when many teachers had never taught that way before the pandemic. According to the study, JTPD provided teachers access to flexible PDs that met their needs when needed and it could be accessed regardless of time or place. In addition, researchers recognized teacher leaders willing to facilitate JTPD to respond quickly to the COVID-19 pandemic.

COVID-19 (First 3 Months) Pedagogical Challenges Addressed

At the beginning of school shutdowns, education and professional development were informed by research on using technology in the virtual setting and what teachers learned about their pedagogy and practice. There were several challenges identified in the literature. In a study by Clausen et al. (2020), communication used during professional development for 7-12 grade teachers and reducing the homework gap during COVID-19 considered responses to a survey on contacts made home to students in the attempt to connect. Results of the study revealed the following challenges: communication by teachers was largely unsuccessful in reaching students and families; the study revealed teachers needed PD on additional strategies to communicate with families; and JTPD was the method of choice.

One month into the lockdown due to COVID-19, Plante and Palmer (2020) conducted a study using the community partnership model (CPM) and the benefits of

having a professional learning network (PLN) model. They studied virtual approaches to provide support and access to meet the needs of teachers, administrators, students, families, and communities, during a crisis, specifically a global pandemic. The study focused on meeting the teachers where they were during the crisis. CPM showed teachers how to best meet the needs of students and families by using the Internet to offer additional learning opportunities and wellness resources. Additionally, it emphasized schools identify lead teachers who would work with other teachers to create a repository of helpful tips and resources for students, parents, and school staff.

Also, during the first few months of the pandemic, anecdotal evidence emerged in the book, *Stories from the Field* (Ferdig et al., 2020), an extensive collection of rapidly growing research on rapid remote instruction during COVID-19. The peer reviewed papers in this book allowed researchers to replicate the processes and use the tools described in their work to build upon existing research to conduct further studies on the technological and pedagogical challenges of teaching during a pandemic. The analysis of Harthorne et al. (2020) highlighted the need for JTPD and the cohesiveness of people and resources to share information and expectations. It also recognized that DL would be a way to provide the necessary training for preservice teachers as they approached a new school year of closures due to the prolonged pandemic. This new area of research opened the door to further studies of instructional technology as a viable alternative to face to face.

Research on leveraging pedagogy and practice using academic communities of engagement (ACE) was conducted by Borup et al., 2020. The study centered on social

learning by Vygotsky (1978). For the researchers, it was necessary to anticipate the teacher's ability to engage effectively, behaviorally, and cognitively and how it could be increase when supported by others. In the ACE framework, those who represent the learning community are teachers, administrators, and counselors, with whom the student had a long-standing (perhaps lifelong) relationship.

The ACE framework applied to teachers, teacher candidates (TCs) and PSTs because, in the framework, the area between independent engagement and the amount of attention necessary for learner success was when the learning community supported students. The ACE framework also identified critical elements of support that allow online engagement indicative of Obsidian learning. This model considered the networking of people and technology as the effect of immersion and the sum-total experiences in remote instruction (Archambault et al., 2021; Ferdig et al., 2020). The current study of K-12 teachers can inform future studies on teachers' challenges and practices.

COVID-19 (First 3 Months) Decisions for Teacher Preparation

By the end of the third month, leading into the summer of 2020, a study by Greene et al. (2020) reported the focus had shifted to the use of educator preparation programs (EPPs). At the universities across the United States the goal was to identify ways in which technology could be used to reach preservice teachers to convey necessary skills and training in virtual and remote instruction. Greene et al. said EPPs provided PSTs with virtual opportunities that were authentic and ones in which they could explore online teaching strategies.

Research by McKeeman and Blanca (2020) considered the use of theory-to-practice tools and techniques (TTT), which prepared TCs to work with English learners (ELs), tying language and online pedagogy to teach content. The participants were first semester TCs in K-12 school settings attending the University of North Carolina's World languages program. They were teaching English to ELs and following the program to learn from classroom teachers. Due to the pandemic, an alternative plan to view videos of teachers teaching ELs was implemented. When considering the videos, TCs identified TTT techniques to teach an ESOL course. TCs were practicing a scaffolding method that could build upon where a student would be learning and provide the opportunity to make connections in a virtual setting. This switch from face-to-face to virtual gave data on this different way of online learning and added learning practice.

COVID-19 (First 3 Months) Additional Challenges Addressed

Three months into the pandemic, the literature indicated an additional challenge of how the pandemic had impacted all learning community members. Therefore, school staff and families adopted a 'we'll get through this together' identity to address this mental health component. Teachers and students were expected to continue teaching and learning amidst uncertainty. The extreme pressure of seemingly unobtainable expectations (Hamlen, 2020) had a toll on social and emotional health. In the study by Statti and Jaafar (2020), researchers utilized data during the COVID-19 crisis to identify "support for implementing trauma-informed practices," (p.2) in schools and a need for "policy reform in support of it" (p.3). The framework they referred to by their research was a trauma informed teaching and learning framework (TITL).

TITL became the direction in which the COVID-19 literature at that time was headed, one from which a focus for additional studies evolved using the framework of resilience theory (Carver, 2020). Based on this model, resilience is an individual's ability to adjust and adapt to significant life changes and the capacity to successfully cope or withstand adverse situations (EdMedia and Innovative learning, 2020). The researchers collected data to show traumatic events affected a person's perception of the world around them and neurobiologically affected brain development for learners, both students and teachers, showed trauma negatively impacted the ability to learn and process events and information.

While trauma differs from person to person, Carver's (2020) study concluded educators must be aware of the signs of trauma in the individual and become familiar with the student's triggers and how students respond to their trauma to meet the needs of the whole child best. The research results by Carver (2020) and Statti and Jafaar (2020) informed school leaders and professional learning networks of the need to educate teachers and future educators on the importance of prioritizing trauma-informed teaching.

By the end of the 2020 school year, three months into the pandemic, ways to address the student and staff needs during COVID-19 had become part of the increasing body of literature on teaching during the pandemic. The study by Baran and Alzoubi (2020) involved human-centered design (HCD) with preservice teachers (PSTs), and emphasized the CoI model in building empathy, centered on pedagogical problem-solving in an online learning environment. HCD pedagogy with preservice teachers

facilitated by CoI during the PD used teacher videos, reflective discussions, and resource sharing.

In preparation for the 2020-21 school year, PSTs were being trained in collaboration and empathy and meeting students where they were. PST practiced sharing quality open education resources (OER), vetted adequately for authenticity and valid share licenses. According to Anduvar & Holmer (2020) teachers dedicated to delivering content and demonstrating skills through collaboration and knowledge building relied on consensus and used open education resources (OER) with virtual instruction. Widely adopted now were massive online courses and learning management systems (Downes, 2017). Teachers interacted with one another and students using computers, laptops, and other mobile devices. It laid a foundation for further research on remote learning in K-12 as a mainstream practice that includes virtual instruction.

COVID-19 (6 Months In) Technology Design Considerations Addressed

As additional months of virtual instruction would be needed, school systems addressed many technology design considerations. Furuta et al. (2020) studied preparing preservice teachers during COVID-19. They compared the results from a technological pedagogical content knowledge framework (TPACK) assessment instrument, which measured general attitudes toward technical and pedagogical knowledge, with a hands-on, technology involved creation experience for an assessment instrument. The Furuta et al. (2020) study found that preservice teachers needed to use technological and pedagogical knowledge in an integrated way. With a sample size of 11 students, including nine males and two females, the researchers examined the responses of

preservice technology teachers as they explored technology and online pedagogy for educational purposes.

The results of the Futura (2020) study concluded teacher education programs needed to include hands-on experiences involving tinkering with technology to promote the idea that technology was an integral part of a new modality of teacher education. It promoted transformative learning, CoI, constructivist strategies, and a human-centered approach to teacher prep. Likewise, some studies found gaps in technology design research, stating that some students would not benefit from remote instruction.

A study by Krutka et al. (2020) covered discriminatory design online learning, asserting additional research would be required to investigate how discriminatory plans negatively impact students. The researchers conducted audits to assist teacher candidates in identifying how technologies could perpetuate social biases. They encouraged the use of exploratory research to expose discriminatory design. Because of the light that the pandemic shined on the existing state of cultural bias, researchers recommended using audits to identify when schools were using technologies that might harm.

A way educational institutions and school systems addressed technology design considerations was to collaborate. The study by Manfra et al. (2020), designing inquiry as a professional learning experience during a pandemic, was a collaborative project between the district's curriculum specialist and university researchers. Findings showed a network of research-based inquiry provides ongoing support to social studies teachers using asynchronous online and self-guided professional learning projects to support teachers at each stage of designing a College, Career, Civil Life (C3) inquiry

teaching/learning model. The results of this study showed digital professional learning could accomplish many of the same goals as face-to- face professional learning experiences and might deepen teacher outcomes since there was an opportunity to provide continued, formative feedback.

Another example of how technology design was addressed was the study by Carey et al. (2020) which showed how the CoP focused on remote learning and teaching by leveraging Twitter, a wide range of professional development pivotal in the transition to remote instruction. Bi-weekly participation in synchronous chats provided the date for Twitter analysis, which indicated initial tweets reached approximately 800 people and follow up tweets got thousands. The data showed community members were eager to understand how to navigate professional development where equity, flexibility, and teacher mindsets were vital in the middle of a pandemic. Emergency remote learning demanded consideration of online communities to nurture student social-emotional health.

Another study by Almendingen et al. (2022) explored school closures and the leveraging of K-12 eLearning by school/university partnerships. Navigating rapid remote online instruction brought the same crisis to school-based teacher educators (SBTEs), university-based teacher educators (UBTEs), and teacher educators (TCs). A critical factor in the developed partnerships was the adoption of technology infusion. TCs shared what they learned via a video recording tool. Findings included a preference by faculty and TCs for video feedback to provide the TCs with an opportunity to reflect on a deeper level on a sustainable model of teacher preparation.

COVID-19 (6 Months In) Pedagogical Decisions Addressed

In addition to technology design considerations, many pedagogical decisions were contemplated and addressed. A study by Lee (2020) centered on successfully transferring the CoI model and applying it to the K-12 setting in a CoP. Key to providing information necessary to make organizational decisions, it included elements of CoP like recognizing resource experts to lead discussions and moderating to facilitate discussions, advocating the use of a Padlet wall embedded on the organization's website. A secondary goal met the need to inform decisions about promoting synchronous activities via social media to personalize the experience.

A revision of what constituted student centered learning was identified in a study by Gomez (2020) which focused on alternative certification teachers in their first year of teaching with no prior experience and on the *Digital Escape* model to help teachers navigate this new educational landscape. Before learning about Project Based Learning (PBL) theories and escape room strategies, teachers did not consider digital instruction to be student centered. By the end of the study, teachers were impressed by the digital instruction model because it was student-centered. In terms of learning outcomes, five teachers designed their escape rooms to review the material before a traditional assessment. The digital escape room proved to be a better review tool.

A study by Grenier and Nelson (2021) provided data on Universal Design Learning (UDL) and collaboration between universities and public schools to train PSTs and in-service teachers within an online learning environment. Such training offered adult learners authentic learning opportunities to consider how to engage students with

technology irrespective of locality or remoteness. In-service and preservice teachers reported having become more in ways to use videos and other instructional technology they could share virtually with students and families. As schools collaborated with higher education institutions, the rapid transition for K-12 schools to online learning required adapting pedagogy to constantly changing factors. The research of Whalen (2020) included an online survey on social media asking teachers to reflect on their experiences having to switch to emergency remote teaching (ERT). Participants shared various challenges faced during the shift to ERT. Overall, participants felt defeated. To many, it was overwhelming to be abruptly immersed in remote teaching strategies with unfamiliar tools. They struggled to adapt the new pedagogy to the ever-changing landscape. Teachers reported the challenges as unreliable Internet, ever-changing personal needs of everyone impacted by the pandemic, and the constant shift in federal, state, and local directives. The research demonstrated a need for support and assistance from professional learning networks.

In addition to changing factors outside of pedagogy, teachers lacked time to plan and prepare for virtual learning. A study by Arenson et al. (2020) demonstrated a need for guidance resources for in-service teachers. They reported they were ill-prepared. Like previous studies, the Arenson et al. (2020) study exposed the scarcity of trained teachers expected to teach instruction with instructional technology. The researchers also found that teachers were not given enough resources for those who desired to incorporate this content into their practice. Many schools simply were not ready to handle the challenges

induced by the pandemic. The study focused on needing a professional learning network with colleges and universities to bridge the digital divide.

Another study on UDL, this time by Smith (2020), examined the rapid incorporation of UDL into technology and science instruction K-12 for students with disabilities using UDL. The implementation of UDL during the Fall of 2020 made it easier to transition to remote instruction for teachers and students. Implications for teacher preparation, educational policy, and students with disabilities (SWDs) were quickly made apparent. The study suggested using the UDL framework as part of teacher education may lead to more effective teachers in the classroom who are ready to meet the needs of a growing diverse student population.

COVID-19 (6 Months In) Additional Considerations Addressed

A study by Kiekel et al. (2020) on in-service teachers used a survey method to ask in-service teachers about their experiences switching to rapid remote instruction. Teachers' frustration was the lack of student participation and technology usage challenges. Because of abrupt immersion in emergency remote education, teachers did not have time to prepare students. Kiekel et al. (2020) concluded the lack of preparation hurt learner agency and emotional well-being. More students were now at-risk. The Kiekel et al. (2020) study was indicative of the impact the global pandemic has had on schools everywhere and the importance of utilizing virtual instruction and the use of either an LMS, a MOOC, or a combination of both. The limited studies related to my research also sought to understand the technological and pedagogical challenges for teachers who taught remotely during the COVID-19 pandemic. My study was specific to

the gap in the literature on challenges for K-12 teachers in the United States with varying levels of skill and experience with remote instruction.

COVID-19 (9 Months In) and Teachers' Use/Adoption of Technology

Remote instruction looked quite different nine months after the start of the pandemic. For eLearning to be successful, it requires a different set of skills from teachers and students (Huck & Zhang, 2021; Nelson et al., 2021; Webb et al., 2021; Williamson et al., 2020). Nine months into the pandemic, many schools had fully adopted a CoP. The results of the literature showed a successful continuation of online learning depended on many factors such as infrastructure (Almendingen, 2022), accessibility, delivery (Beck & Beasley, 2021), willingness to use (Huck & Zhang, 2021; Nelson et al., 2021), socio economic challenges (Webb et al., 2021) student readiness (Williamson et al., 2020), teacher preparedness (Archambault et al., 2021), and support from the community (Kaufman & Diliberti, 2021).

Singer (2020) determined from an analysis of the research that most important to success was the establishment of a CoL infrastructure with the following essential factors emerged: the need to form relationships first, then move on to content, followed by measurable learning objectives, providing prompt, meaningful feedback, along with differentiating instruction to address learning styles, preferences, and needs, and finally, organizing content clearly and consistently. Singer's study related to the scope of this study and my interview questions. I sought to get insight from teachers on their interactions with people and technology within the CoL infrastructure, which had developed during the pandemic.

Carey et al. (2020) study focused on schoolwide strategies amid a pandemic. A survey was sent to co-teachers asking them to reflect on remote co-teaching experience to determine if they had established new norms for teaching online. Many felt remote co-teaching norms were different but just as crucial as norms established for face-to-face. The study demonstrated the importance of CoI. In line with Vygotsky, Downes, and Obsidian, this framework is related to developing "social presence."

A study by Shin and Borup (2020) explored synchronous and asynchronous exchange during remote instruction using CoI, aligning with the K-12 focused National Standards for Quality Online Teaching. Faculty typically use this approach to facilitate adult learning at the college level. Research has shown a cross-over of higher education pedagogy and K-12 practice (Pittman et al., 2021). K-12 institutions now utilize CoI as a model for professional development and pre/in-service JTPD (Hartshorne et al., 2020). By adopting the CoI model to K-12 to meet the demands of rapidly switching to virtual learning, schools now rely on it for a CoP (Carey et al., 2020; Clausen et al., 2020).

Providing support for early research on learning communities, CoI applied to the new K-12 environment as it centered around the quickly evolving practice of virtual learning (Manfra et al., 2020; Safi et al., 2020). Schools around the country implemented a research-based approach for K-12 virtual instruction to navigate the pandemic for K-12 schools. Recommendations from the study were to adopt CoP strategies and focus on the end goal of delivering skills remotely and to show support for webinars. According to the study, many teachers attended the webinars. Survey results showed teachers viewed the PDs as helpful.

As a result of the pandemic, research and experience have shown a successful continuation of learning involves a structured CoP where "everyone is expected to take the time to listen, inquire, reflect, and respond to each other" (Miller et al., 2021, p.22). Individual learning paths need to be designed and implemented. Expanding on this belief, Hartshorne et al. (2020) recommend attempts to promote CoP should be a national standard for schools. For many teachers, this was a reality before the pandemic hit, and seeing it emerge in full force during COVID-19 reminded educators they were already pre-conditioned to use the Internet for increasing knowledge, showing an ability to make sense of the world of K-12 learning.

Regarding equity of instruction, a study by Leacock and Warrican (2020) of teachers in response to COVID-19 and pandemic readiness, the analysis of the data showed a different perspective and skills were essential, which included best practices with technology and making pedagogical decisions to meet needs of all students in all situations. The Leacock and Warrican (2020) study referenced the Obsidian Model in recommending a strong teacher education program that equipped teachers and others in the CoL with knowledge, skills, and competencies in technology and meeting academic, emotional, and social needs of learners to implement alternative pedagogies in a supportive step towards this goal. COVID-19 exposed the real and ever-present need for these changes in mindset and implementation.

The pandemic forced veteran and student teachers to become familiar with multiple technology platforms, which according to Holder and Mills (2020), impacted and enhanced their teaching for the future. In their study of the pandemic and student

teachers, Holder and Mills (2020) reported cooperating teachers (CT's) relied on the stereotype that student teachers (STs) were proficient with technology. CTs believed STs knew about appropriate technology since the majority represented the Millennial and Generation Z population, referred to as the digital population. This may have added to the stress as both groups were abruptly required to switch to rapid, remote, virtual instruction, in most cases, not giving student teachers time to explore and identify available technology to match what they had been taught in their undergraduate program. Student teachers were forced to research tools to implement in virtual instruction while simultaneously practicing. They became familiar with what an LMS looked like (Chambers & Lipscomb, 2020), how to use learning analytics (Lee, 2021), and what collaboration tools would improve how students learned and could communicate Safi et al., 2020), as well as sustain teaching presence.

Teachers benefitted in the long run from skills acquired as they participated in virtual professional development (Miller et al., 2021) to learn and assess their use of web-based resources and technology. Later studies, such as the research of CealLaigh et al. (2020), showed that CoI teachers became collaborative partners by increasing their technical proficiency and improving instruction consistent with sound pedagogy to provide students with skills needed to compete in a digitally literate world. The considerations suggested by this study were not a panacea for meeting the demands of the next pandemic. Still, the research supported CoI as a first step to managing the crisis created by COVID-19 and a viable framework when applied to rapid remote instruction to keep the focus on a learning community.

COVID-19 (12 Months In) and Teachers' Use/Adoption of Technology

Transitioning to a new school year during COVID-19 required teachers and teacher educators to shift to intentional practices of integrating technology to promote pre- and in-service teacher engagement and learning (Pittman et al., 2021). JTPD had quickly turned into an 'infrastructure of research and development' by the time a full academic year of virtual learning had finished, a silver lining after an initial disregard for the response plan by the U.S. Department of Health and Human Services, Center for Disease Control and Prevention (2017).

According to Sanders and Lokey-Vega (2020) and supported by Schelling et al. (2021), both CoP and CoL frameworks emphasized several key points. Online learning requires highly skilled participants trained in current technology. Two, the motivator for students are the teachers, who should equip themselves to increase their competencies in education technology. Three, it is essential to have clear expectations and a visible plan. An online learning schedule was critical to the continuity of learning. Four, video conferencing discussion forums and informal interactions allow for self-reflection. Five, treat teachers as learners by providing theoretical and practical knowledge for teacher theory learning, teaching materials easily understood in images, animations, PowerPoints, interactive multimedia, and other material formats. Finally, actual point number six, when implementing online learning, teachers must be able to provide socialization. For teachers as learners, CoP proved to be pivotal to future teacher education and professional development.

Over the 2021 school year, a unique situation occurred in researching the pandemic and schools. Case studies conducted during the pandemic exposed the severity of inequity and its impact for low-income families, students of color, and students with special needs (Kaufman & Diliberti, 2021). My study assisted in filling the gap in the research on the challenges for K-12 teachers who taught remotely during the COVID-19 pandemic when many had little prior training or experience.

A unique situation occurred in researching the pandemic and schools. Many anecdotal qualitative and quasi-research studies and case study research (Ferdig et al., 2020) were propagated in e-book collections (Ferdig & Pytash, 2021) and appeared at conferences and professional training by major education technology venues and organizations. Due to methodological and design rigor requirements, they were not published immediately; therefore, the only way to obtain the literature was through membership in professional associations to gain online access. Access included a study by Nelson in 2021 on instructional strategies for face-to-face before the pandemic and those used during the pandemic. The Ferdig and Pytash (2021) study identified four key factors or *pillars of digitally infused education* leading to the best outcomes for students and schools: 1) technology, innovation, and instructional design; 2) flexibility and adaptability; 3) building relationships; and 4) establishing pedagogy of care. Identified technological and pedagogical challenges for teachers were cognitive load and building these relationships for a sense of social presence. In addition, case studies conducted during the pandemic exposed the challenges and demonstrated the resilience and resolve to want to meet the challenges head on.

One study by Thonnessonn and Budke (2021) of preservice teachers and learning on and off-site during the pandemic showed how staff development teachers could complete staff training through digital field trips. These trips taught teachers how to develop digital guides for their teaching. This method of delivery had merits and challenges, proving to be a sound teaching strategy. Digital field trips and other systems implemented during COVID-19 were viable for use in a remote, hybrid, and face-to-face setting beyond the pandemic. The growing body of literature for understanding the technology and pedagogical challenges associated with leveraging technology did not reference K-12 teachers. Therefore, it aligned with the purpose and scope of my study. It not only showed the challenges but also helped my study to expand on the little understanding of the technological and pedagogical challenges for teachers with little distance education experience who taught remotely during the COVID-19 pandemic and the implications to future studies and practices with remote instruction in K-12 learning environments.

Summary and Conclusions

My study addressed the gap in the literature on technological and pedagogical challenges for teachers who taught remotely during the COVID-19 pandemic when many had little prior training or experience. The pandemic forced schools to look hard at how they failed to prepare after previous pandemics or natural disasters. Archambault et al. (2021) described education as transforming into new learning adapted to the era of pandemic preparedness and disaster planning. They also started a fourth generation of the industrial revolution, had transferred the way of life, learning, and interacting by forcing

people to strive toward creating a sustainable future. Sustainability starts with infrastructure and support (Carey et al., 2020; Ferdig et al., 2020). For schools, the infrastructure was being built to support a CoI embedded within a larger CoP, significantly optimizing remote learning.

Three months into the pandemic, it had become increasingly apparent from the literature that the pandemic had impacted all members of the learning community; therefore, it was also determined school staff and families adopted a "we will get through this together" attitude. Early pandemic studies found gaps in the research regarding technology design, and six months in, frustrations for teachers were reported, such as the following: 1) a lack of student participation and accountability; 2) technology usage challenges; and 3) personal frustrations (Furuta et al., 2020), with the most often reported frustration being a lack of student participation and accountability. Pre-k to 12 students still relied on teachers. The sudden emersion in emergency remote instruction meant teachers did not have time to prepare students for the shift and ensure the necessary skills for online learning were present.

Remote instruction looked quite different in year two of remote teaching, with K-12 utilizing online research CoPs (Archambault et al., 2021) and CoI (Lee, 2021). The traditional classroom no longer existed. It was replaced by a technology-mediated culture of care (Miller et al., 2021). For online learning to be implemented successfully, this required different skills from teachers and students. The results of the literature showed the successful continuation of online learning depended on many factors such as infrastructure, accessibility, delivery, meeting socio economic challenges, student

readiness, teacher preparedness, and support from the community. With a focus on digital equity and educational inclusion (Pittman et al., 2021) backed by research on the prevalence of divergent and inequitable teaching and learning (Kaufman & Diliberti, 2021), and with funding from the U.S. Department of Education to improve in these areas during the pandemic and beyond, schools were more prepared for remote instruction year two of the pandemic.

Chapter 3 details the research design and rationale, followed by a delineation of the role of the researcher. The third section outlines the research methodology and the procedures for participant selection, instrumentation, recruitment, participation, data collection, and data analysis. The final section includes potential issues of trustworthiness, and ethical considerations related to this qualitative study, followed by a summary of why covering these aspects of the investigation leads to thorough and reliable research.

Chapter 3: Research Method

The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. This research addressed the lack of understanding of the technical and pedagogical challenges of teachers with little distance education experience and who taught remotely during the pandemic. The first section of Chapter 3 addresses the research design and rationale as it relates to the two key research questions. The second section describes my role as the researcher and the ethical issues I needed to consider. The third section addresses the method I used to select participants and the procedures for recruitment, participation, data collection, and analysis. The fourth section addresses trustworthiness and ethical considerations. The fifth section concludes with a summary of the chapter's main points.

Research Design and Rationale

The reason to conduct a study such as this was to address the central research questions:

RQ1: What did K-12 teachers perceive were the technological challenges of teaching remotely during the COVID-19 pandemic?

RQ2: What did K-12 teachers perceive were the pedagogical challenges of teaching remotely during the COVID-19 pandemic?

For the current study, gathering data on technological and pedagogical challenges for teachers who had just received JTPD, as discussed by Neuman and Durst Smith (2020), provided an opportunity for a broad understanding of the experience.

Evidence from the early studies on teaching during the COVID-19 pandemic revealed a growing body of evidence showing teachers felt overwhelmed and unprepared to use remote teaching strategies and struggled to adapt to teaching pedagogy to fluctuating situations brought on by a pandemic. Adoption of online pedagogy became a focus for my research questions to determine the challenges teachers experienced while teaching remotely during the pandemic. The current study addressed a gap in the literature regarding technological and pedagogical challenges for teachers immersed in remote instruction for up to a full academic year during the COVID-19 pandemic when many were not trained to teach in a remote learning environment. Through responsive qualitative interviews of teachers on the experience of teaching during school shutdowns, the current study invited K-12 teachers' in the United States to self-report the challenges they faced teaching virtually during a pandemic. Before the start of my study, a well-established body of quantitative research (Borup et al., 2019; Cançado et al., 2018) had demonstrated a strong correlation between the use of web-based technology and positive student outcomes. A body of research was also growing on teaching remotely during the pandemic (Borup et al., 2020; Ferdig et al., 2020).

The Borup et al. (2020) study considered the need for teachers and students to develop and leverage technology to meet the needs of a learning community of engagement, given the educational, personal, and societal needs of navigating the

pandemic. Ferdig et al. (2020) gathered a compilation of emerging studies during the onset of school closures which provided a landscape for the challenges teachers faced attempting to implement rapid remote instruction during the Covid-19 pandemic. The care and creativity that typically exists in planning was replaced by desperation given the timeline and challenges schools had with technology accessibility, prior use of technology, and the adoption of online pedagogy.

Phenomena of Interest

The phenomena of interest for this study were both the technological and pedagogical challenges of teaching remotely during a pandemic. The National Standards defined remote instruction for quality online learning as moving content online for limited or one-time-only course instruction (Aurora Institute, 2020). Like others at that time, my study considered teachers' experiences teaching remotely during the COVID-19 pandemic (Borup et al., 2020; Ferdig et al., 2021; Heinrich et al.,2020), having had limited training or experience. This study was about K-12 teachers in the United States immersed in remote instruction for a full academic year when many were not experienced with virtual instruction and the use of online learning platforms.

Central Concepts

Distributed learning was the conceptual framework for this study (Downs, 1978), using the Obsidian model (2016) as it involves the theory of social constructivism (first conceived of by Vygotsky). Due to an interest in a framework beneficial to a study with teachers, distributed learning was the preferred model for this study as it may be possible to transfer the results of this study to the development of teachers and staff. Victor and

Hart (2016) wrote that for adults, training is done in the form of massive online staff training to respond to a need to provide immediate and impactful job skills development. Figures 1 and 2 represent distributed learning and social constructivism and how they relate to the critical research questions.

Figure 1

RQ1, Distributed Learning, and Constructivist Frameworks

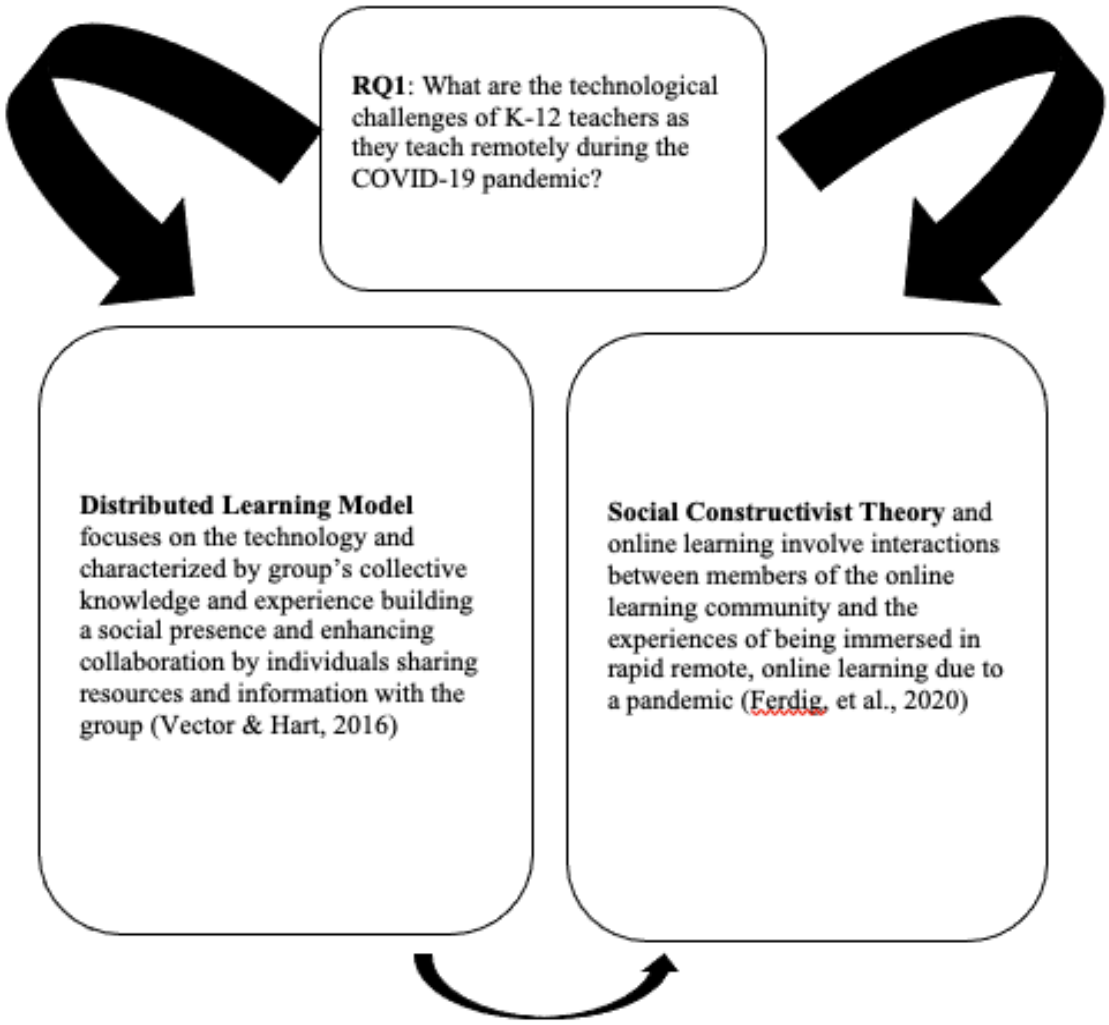
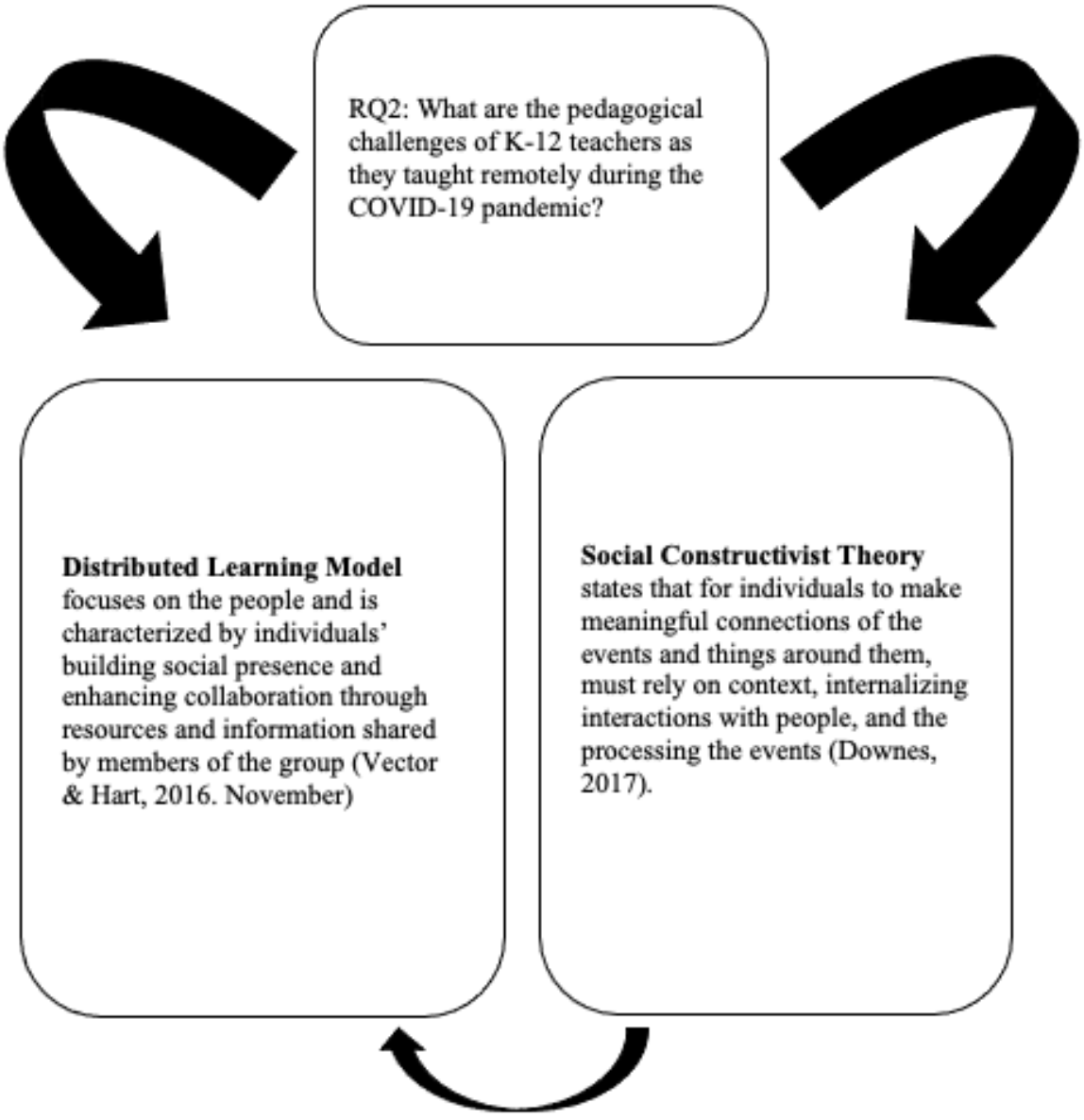


Figure 2

RQ2. Distributed Learning and Constructivist Frameworks



In both Figures 1 and 2, distributed learning and social constructivism for adults considered the context of an experience, the quality of the interactions, and a long-lasting appreciation for and deployment of skills valuable to job performance.

Research Traditions

To explore the technological and pedagogical challenges of teaching K-12 grade level students remotely during a pandemic, a basic qualitative study interviewing teachers provided opportunities to explore the meaning of the challenges of teaching remotely during a pandemic using data collected directly from the participants. Creswell (2015, p.4) supported qualitative research as an approach for “exploring and understanding the meaning individuals or groups ascribe to a social or human condition." Creswell and Poth (2016) recommended aligning the research methods with the framework. In the case of my study and social constructivism, it is supported by Creswell and Poth who believe researchers should "understand that interpretations of an experience are varied and multiple, leading the researcher to look for the complexity of views" (p. 47).

Basic qualitative research is frequently employed in applied research and is most widely used in social science fields, particularly studies in education (Yin, 2015). For this reason, I assert that since a constructivist approach emphasizes human interpretation and collective understanding of an experience, each response can be coded as such. Saldaña (2021) reminds us, however, that "the more well versed you are in eclectic methods of investigation, the better your ability to understand the diverse patterns and complex meanings of social science" (p. 3).

The research for my study was basic qualitative research. Since Patton (2015) said, "qualitative analysis involves interpreting interviews, observations, and documents to find substantively meaningful patterns and themes" (p. 5), the best way to structure my data collection and analysis to answer the critical research questions using a small sample size was not to choose narrative or ethnographic study, but a basic qualitative analysis. I did not select a narrative because it would have involved an analysis of biographical stories which explained the individual's experiences as part of the phenomenon (Patton, 2015, pp.128-131). For me, the pandemic was not directly under study. So how participants were managing the crisis was not a part of my data collection. It was the challenges of teaching remotely. Ethnography was not a good fit for my study because this approach would have required me to become an active participant. I would have to have spent a considerable about of time as a natural part of the environment which was being observed (pp.100-103). My participants were selected nationally, and I did not intend to participate in the study.

Selecting the basic qualitative tradition allowed me to utilize interviews and recordings to comprehend a particular phenomenon, which was, for my study, an unprecedented global pandemic. Applying a basic qualitative framework for the study allowed for data gathering and analysis flexibility, optimal for my experience as a research practitioner. I examined even novice teachers' experiences teaching remotely during the COVID-19 pandemic in response to school closures. I rejected both a case study and a phenomenology approach because the intent was not to look at a phenomenon and a group of teachers teaching the same subject, same grade level, or in

the same school district. I was interested in a cross-section of teachers around the United States, many of whom had minimal experience or training with remote instruction and were forced into the online modality. A phenomenology approach focuses on lived experiences of the study's participants (Patton, 2015). My research did not expand upon any other challenges teachers faced during the pandemic, only the challenges they had with teaching remotely.

Considerations for Other Designs

I chose not to conduct a quantitative study because quantitative research would have required me to look at relationships between defined variables. The research questions allowed me to look at the technological and pedagogical challenges for K-12 teachers in the United States who were mandated to teach remotely during the COVID-19 pandemic, where the variables were undefined. In addition, I rejected the quantitative research approach because I did not intend to use my study to test an assumption. I also did not intend to predict or confirm a hypothesis.

With my research I intended to obtain rich descriptive data. My goal for selecting the specific sample was, as Patton (2015) phrased it, "to have those that will yield the most relevant and plentiful data - in essence, information rich - given the topic of study" (p.93). A problem I would have encountered with a quantitative approach was using random sampling methods and structured data collection to analyze data based on predetermined categories applicable to a larger population. My basic qualitative study used semistructured interviews to collect data from a small non-random sample to categorize like-responses as themes. The purposeful use of themes allowed me to

generalize to a larger population of K-12 teachers. This was not indicative of a quantitative study. Therefore, a quantitative approach would not have been appropriate.

Using a basic qualitative approach allowed me to understand the technological and pedagogical challenges for K-12 teachers in the United States as they taught remotely during the COVID-19 pandemic. Choosing qualitative analysis allowed me to explore variety in a real-life experience rather than considering a specialized qualitative tradition such as case study, ethnography, evaluative research, or phenomenology (Patton, 2015). Technological and pedagogical challenges of remote teaching during a pandemic was a concept with an emerging definition before COVID-19 (Archambault et al., 2021; Cançado et al., 2018). Participants in my study were defined by their unique experiences.

Using this basic qualitative research strategy during the pandemic provided opportunities to explore in various forms the meaning of the unique experience through the perspectives of a purposeful selection. Yin (2017, p.93) stated, "the goal for selecting the specific sample is to have those that will yield the most relevant and plentiful given your topic of study."

Role of the Researcher

In my study, the primary role was to collect and analyze data on the technological and pedagogical challenges for K-12 teachers in the United States as they taught remotely during the COVID-19 pandemic. Participants for this study were certified teachers. Two were in their first 2 years of teaching, while the rest had been teaching for up to twenty years. They had to have been teaching virtually in some capacity during the pandemic. I was a member of this same professional group of teachers and belonged to some of the

same professional social media groups. Due to the pandemic, I also implemented the same continuation of learning via virtual instruction. I made sure not to include any teachers from the same school.

A vital consideration for all studies is the management of researcher bias, as described in Creswell and Poth (2016), Patton (2015), Saldaria (2021), and Worthington (2013). Example of how important it was for content validity and trustworthiness, the study by Gray et al. (2020) was transparent about the limitations of a study on Zoom. In preparation for the study, the researchers say they economically selected conferencing software that supported research aimed at large numbers of participants and diverse and geographically dispersed populations; however, they later included participants' recommendations for using Zoom conferencing to conduct a future study. Another study by Kaliber (2019) included the considerations made regarding research bias and credibility in results as a contribution to the field. As for my research, many participants had little to no remote teaching experience. I had to remain mindful that I had taught for more than nine years as an online teacher and my duties as a face-to-face teacher.

While 10 out of 12 of the teachers who participated in the study were not trained to teach online before the pandemic, virtual instruction had been mandated since the onset of the pandemic, and I could have had a strong positive bias towards those who had open to implementing online education with some level of expertise. Therefore, managing researcher bias involves debriefing sessions regularly through supervisor feedback and journaling for self-reflection (Patton, 2015). During my study's design stages, I collaborated with my dissertation committee to craft unbiased interview

questions. During data collection, maintained a journal to address known and discovered biases. During data analysis, I solicited additional feedback from my dissertation committee to ensure my interpretation of the data was balanced and free from preconceptions.

This basic qualitative study aimed to understand the technological and pedagogical challenges for K-12 teachers in the United States as they taught remotely during the COVID-19 pandemic with varying levels of skill and experience with remote instruction. This approach to this basic qualitative study was exploratory with a focus on informing future practice. Due to a current level of expertise in teaching online with the use of learning management systems and extensive training in online learning pedagogy, taking a novice approach to this study was inappropriate. An appreciative 'fellow professional' approach was the most appropriate for this study.

The primary focus of my study was the pursuit of the Doctor of Philosophy in education technology. I focused on presenting myself as a trustworthy professional experiencing similar trials and having little familiarity with the ever-changing demands of teaching remotely during a pandemic. There were participants in the study who were in their first 2 years as teachers or had little to no prior experience teaching online, which could have presented a potential challenge for me as the researcher. I informed the two participants who asked that I was an online and face-to-face teacher with ten years of experience teaching online.

I addressed participant hesitancy or perceived power differential by interacting with participants as a colleague via email in which I shared the purpose and scope of the

study so that all prospective participants were aware of why I conducted the study, to inform the field of education technology with an analysis which would have implications for positive social change. I told participants that the study fulfilled one of the requirements to complete the doctoral degree. The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic.

Methodology

This section begins with a description of participant selection logic. In addition, it covers additional components of the methodology, the plans for instrumentation, and the procedures for recruitment, participation, data collection, and data analysis. The methods for this basic qualitative study included using a virtual interview data collection strategy, researcher journaling for ongoing reflection, and peer feedback to mitigate research bias.

Participant Selection Logic

The logic for selecting twelve K-12 public school teachers resulted from a sampling strategy based on widely accepted criteria for selecting participants. By sharing an eligibility questionnaire via social media, I used an approach that identified participants and allowed for further recruitment via snowball sampling, allowing prospective participants to share the post with other teachers (Saldania, 2021; Worthington, 2013). The target group of interest consisted of K-12 teachers in the United States who agreed to share their experiences teaching online during the COVID-19

pandemic. Sample teachers had a state certification in the subject they taught and completed robust degree requirements to be a teacher.

Inclusion Criteria

I determined I needed volunteers who were certified K-12 teachers in the United States who taught remotely during the pandemic. Using self-selection criteria, participants pre-determined their eligibility (Naderifar et al., 2017). Purposive sampling was conducted according to standards aligned with the research questions for the study. (Rubin & Rubin 2012; Saldana, 2021). Procedures for gathering participants included sending out an infographic as a call for participants to use social media. I was able to get the participants needed via a post on both a Facebook and a Twitter page managed by myself, requiring potential subjects to meet the criteria to reduce the pool to a manageable target group of twelve. Later, I included the same post on LinkedIn, a professional networking site.

Recruitment involved a brief introduction of the study followed by a self-selection of eligibility by asking participants yes/no inclusion criteria questions on a Google survey form. If they answered "no" to any questions, the Google form directed them to an exit page that said, "thank you for your willingness to participate, but you currently do not fit the inclusion criteria for my research study." If they answered' yes' to the question, they could continue to the next question. The following form page contained the IRB-approved informed consent. After reading the informed consent, prospective participants answered whether they would like to be in the study. If the participant answered 'yes. I'd like to participate in the study; they were moved to the next form page. If the participant

selected' no' they would not like to participate in the study, they were directed to a landing page where I thanked them for their time and instructions to exit the form.

The inclusion questions were used to collect only the demographic information necessary to determine the identity of the participants related to the study inclusion criteria. This included whether they were certified teachers in K-12 schools and if they were teaching remotely during the pandemic. Interested teachers who identified as meeting initial eligibility requirements were required to fill out every question and continue through the survey to provide me with contact information, such as a current email address or phone number, for further communication regarding eligibility. I embedded a link to this survey in the infographic on social media. The voluntary consent form gave them additional information they may have needed, such as my contact information and contact information for Walden University. Online consent was implied, meaning; it was explicitly stated if potential participants digitally gave me their name and contact information after reading the voluntary consent, they were to understand it indicated they "signed" the consent form.

An appropriate number of participants needed for data saturation in this basic qualitative study is typically a very small number (Quin, 2015; Rubin & Rubin, 2012; Saldana, 2021). For an in-depth inquiry study such as mine that covered instruction online during school shutdowns, data saturation was achieved at interview 9. While studies exploring overarching themes did require six individual interviews to achieve data saturation, studying a practice developing over an extended period based on an under-studied phenomenon would require a more significant number of single interviews to

delineate more detailed themes (Saldana, 2021). Follow-up email communication with participants after completing the interview provided depth and context to data collection. It allowed me to confirm responses, answer questions, and address any study concerns on the part of myself, the researcher, and the participants.

Instrumentation

Semistructured interviews were the chosen instrument for this qualitative study to gather data. Following the recommendations in Saldana (2021), I could determine whether data saturation would be reached when continuing to collect data no longer provided me with new concepts or themes. Saldana (2021) stated, "when no new information seems to emerge during coding, that is, when no new properties, dimensions, conditions, actions/interactions, or consequences are seen in the data" (p. 248).

For my study, making a choice to interview additional participants would not be necessary, as it would show redundancy and possibly waste time and resources (Yin, 2017). Yin highlighted the importance of purposeful sampling and asserted that one should "consider structured interviews and interview guide" (p. 141). My study used an interview guide and semistructured questions, so all participant responses addressed the same questions. Yin reiterated that the "number of instances" (p. 157) or in my case the number responses from each of my 12 participants, would impact when data saturation is reached. Interviewing 12 and asking ten questions to each could allow me to get data saturation rather quickly if answers were being duplicated.

To minimize the chance of gathering redundant data or data that did not address the research questions, I included an interview guide complete with the interview

protocol and questions. The virtual interview data collection instrument (Zoom.us) was essential (Creswell & Poth, 2016) and allowed the participant some flexibility in responsiveness during the interview. The guide provided participants and me with a consistent format and questions for each discussion (Patton, 2015). As a researcher, I wanted to capture varying responses to the interview questions. During data collection, at the point at which responses were being duplicated, I would determine the study had reached data saturation.

The interview guide organized the questions, so each interview opened with broad inquiry (Gray et al., 2020; Worthington, 2013). The first section of the interview guide drew upon qualitative and quantitative literature on teaching online and teaching approaches used during previous school shutdowns due to a pandemic, for which the literature was limited. To produce the interview guide for this study, I included statements outlining the purpose of using the interview guide. I provided a brief introduction and explanation of the framework of the study, followed by a list and basis for the choice of interview questions. I had to maintain some flexibility to allow for the free depiction of events by interviewees of their implementation of the online modality. I began with a statement of the intent of my study to uncover meaningful experiences and memories, which addressed the research questions.

The initial interview questions provided contextual information. For each question, I followed up with one or more probing questions to encourage the participant to describe specific events and examples of the phenomena. Each interview was scheduled for 30-45 minutes. Participants were more open to these questions because

they shared information about themselves as teachers. Each teacher was able to explain past teaching experience and current settings, mainly as they switched to online instruction.

Having a status as a fellow educator, I engaged in meaningful conversations with fellow teachers about utilizing similar tools and training for teaching virtually during the pandemic. A perceived power imbalance was diminished through conversation, empathic listening, receptivity, and respect. Content-rich questions followed. This allowed participants to engage with researchers in shared experiences, good and bad. I was mindful of bias through the instrumentation covering the data collection instrument for this study focusing on the interview guide.

Because virtual interviews serve as the only data source for this study, the interview questions were designed to enable a focus on the research questions (Creswell & Poth, 2016). Each interview in this study was virtual and audio-recorded using Zoom recording tools. Therefore, it required me to disseminate a consent to record form. Table 1 shows how the interview questions aligned with the critical research questions considering the selected framework.

Table 1

Alignment of RQ1, Conceptual Framework, and Interview Questions

Conceptual Framework Name	Conceptual Framework Description	Interview Question
Distributed Learning Model	individuals sharing resources and information with the group for collective knowledge (Vector & Hart, 2016. November)	IQ1
Distributed Learning Model	builds social presence and enhances collaboration (Vector & Hart)	IQ2
Social Constructivist Theory	meaningful connections in context, internalizing interactions with people, and processing the events (Downes, 2017)	IQ3
Social Constructivist Theory	interactions between members of the online learning community and the experiences of being immersed in rapid remote instruction (Ferdig et al., 2020)	IQ4 with the subquestion - technological challenges of using websites and online tools with students with an IEP or 504 that requires they receive specified accommodations?
Social Constructivist Theory	meaningful connections to the events and things around them must rely on context, internalizing interactions with people, and processing the events (Downes, 2017).	IQ5 with the subquestion - first 3 months, 6 months, 9 months, 12 months? What worries you about a full school year of virtual instruction?

The conceptual framework of distributed learning guided my choice of which interview question to ask, given the variables of time and the implementation of online platforms and online communication tools necessary during the pandemic. Having a timeline proved vital to participants' answering the two key research questions on the technological and pedagogical challenges for teachers during COVID-19.

Table 2

Alignment of RQ2, Conceptual Framework, and Interview Questions

Conceptual Framework Name	Conceptual Framework Description	Interview Question
Distributed Learning Model	Individuals sharing resources and information group's collective knowledge (Vector & Hart, 2016. November)	IQ5 with the subquestion - what are the pedagogical challenges of keeping your students engaged?
Distributed Learning Model	Building social presence and enhancing collaboration (Vector & Hart, 2016. November)	IQ6 with the subquestion - what are the pedagogical challenges of leveraging web learning tools with English language learners? And sub question - what are the pedagogical challenges of leveraging websites and online tools with students with an IEP or 504?
Social Constructivist Theory	Making meaningful connections between the events and things around them (Downes, 2017)	IQ7
Social Constructivist Theory	Relying on context, internalizing interactions with people, and processing the events (Downes, 2017)	IQ8 How has rapid remote instruction factored into your pedagogical challenges and preparedness for virtual education?
Social Constructivist Theory	Making meaningful connections between the events and things around them (Downes, 2017)	IQ9 with the subquestion - what are some of your take-always from experience?
Social Constructivist Theory	Relying on context, internalizing interactions with people, and processing the events (Downes, 2017)	IQ10 with the subquestion - what influence has it had on student attendance, participation, engagement, and completion of work? And subquestion - how have the results been the same or different with different students?

Each of the tables above showed the connection between the interview questions and the conceptual framework used to examine the responses from teachers on the technological and pedagogical challenges of teaching remotely during COVID-19.

Recruitment and Participation

Before recruitment I determined the target group, certified teachers who were teaching during the pandemic, and I allowed prospective participants to self-select based on answers to four eligibility questions. One strategy used was an infographic with friendly and inviting text, hashtags, and an emoticon to catch the attention of potential study participants. The infographic was posted on manager-approved professional teachers' Facebook, and Twitter feeds and accessible via a Hashtag on my own professional Facebook and Twitter page and LinkedIn. This was done to increase the chances of being viewed by active teacher members on the pages. Knowing the potential to encounter imposters when using social media platforms, I sought approval to join private professional social media pages of teacher groups, as well as completed public searches directly on LinkedIn, a widely recognized professional site. Anyone wishing to join professional groups' social media platforms had to request to be granted access. The organization vetted individuals before being granted access.

During recruitment, I posted the initial request, followed by frequent follow-up posts and retweets using hashtags, as well as direct messaging, to see if whom I interacted with could provide additional leads or repost my posts and tweets to promote the study. I revisited the platform to update the infographic based on the recruitment process status. The potential to have imposters respond to the post resulted in a decision to implement a procedure to verify participant honesty during recruitment. This was a pre-selection criteria question on the Google form. While visiting the social media pages regularly and looking for opportunities to post or tweet about the study, I had to be

sensitive to when and what to post. I purposefully either refrained from posting or actively targeted posting more frequently if it was determined that interest in the study was waning.

The ideal setting for a qualitative interview was a quiet space where the participant and I could sit and have a private, mindful conversation about the topic, regardless of spatial location and distance. The reality was that the ideal setting was not always available. In the case of a pandemic, school shutdowns, or social isolation, when the only option available is the phone or virtual meeting, I thought it would be best to use the mode of communication already being used for virtual instruction. For this study of twelve K-12 teaching remotely, I utilized audio- recorded interviews of Zoom meetings, using the ZOOM.us conferencing tool (or Google Meet, as the backup if someone is having difficulty using Zoom). Each interview was between 30 and 45 minutes.

Interviews were voluntary and agreed upon in advance. I took appropriate steps to ensure confidentiality. I conducted interviews in a room where I could lock the door so no one else could enter, ensuring participants' privacy. I stored their project data in electronic format for the duration of the study and then disposed of the data at the end of the study. Additionally, I de-identified the data as soon as possible to minimize the risk of inappropriate disclosure of personal information. This meant removing all direct identifiers such as names, addresses, or telephone numbers from the raw data and databases.

To present a well-organized study that followed all requirements for submission, I submitted to the IRB a completed application and voluntary consent form dissertations to

all participants who volunteered and were selected to participate in the study, using a Walden University approved consent form. As for data protection, a master list of the participant names was stored separately, and password protected from data collection tools. All the data and data collection tools, surveys, transcription procedures, and recorded data were housed online via a protected computer, protected with a secure password. At study completion, all documents collected were stored for a maximum of 5 years in a password protected space on the cloud.

Recruitment initially considered looking at websites of public schools in my state and emailing teachers' public email addresses. It was later changed to posting a call for participants on social media. The first 12 who responded to my post, met eligibility requirements, and completed participating consent were selected. Each participant was sent a link to schedule an interview to Doodle Poll, which included a schedule reminder. This was an excellent way to prevent time lag between discussions and missed opportunities for responses to something occurring in real time. Sending LinkedIn In-mail communications to teacher connections with a link to the eligibility questions was used. This recruitment method limited the opportunity to develop spontaneous responses from those who could not be authenticated, and it preserved the requirement of having to be a teacher.

Data Collection and Analysis Plan

The study involved virtual interviews as the primary data collection method and LinkedIn In-mail and standard email communications to send invitations, confirm participant consent, conduct error checks, and schedule makeups for missed virtual

interviews. This study was based solely on virtual qualitative interviews and included an interview guide with specific interview protocols and questions. This method of virtual interview data collection was essential (Creswell & Poth, 2016), as many interactions for training, information sharing, and information gathering had remained virtual due to the ongoing pandemic.

As a means of purposeful sampling in this case, I relied on having a larger population of K-12 teachers in the United States, subcategorizing by grade level for the research goal of ensuring the data included cases from each category of elementary, middle, and high school teachers. As a comprehensive strategy, I relied on *word of mouth* to ensure I would have enough eligible participants. After having to shut down the study for more than six weeks, this proved to be beneficial.

Because the research questions for this study explored the unique and specific experiences of a broad range of teachers teaching virtually during a pandemic, stratified sampling was justified. It allowed me to address the practical consequences and useful applications of what we can learn about teaching virtually during a major crisis from the point of view of elementary, middle, and high school teachers. I interviewed each participant separately to collect data on every one of the participant's experiences. This data included context and a timeline of each district's responses to the pandemic, the requirements for virtual teachers, and the various phases of instruction as schools attempted to gradually re-open.

The central research questions for this study were:

RQ1.What did K-12 teachers perceive were the technological challenges of teaching remotely during the COVID-19 pandemic?

RQ2. What did K-12 teachers perceive were the pedagogical challenges of teaching remotely during the COVID-19 pandemic?

Data was captured via audio recording in Zoom (Zoom Video Communications, Inc., 2016), and transcription took place using the dictation feature, an audio transcription extension in Microsoft Word (Microsoft, Inc., 2010). Known for its clear and accurate speech-to-text quality, MS Word 10 made it convenient to transcribe voice responses and allowed me to take extensive reflection notes via dictation. Dedoose (Dedoose Inc., 2018), coding and analysis, cloud-based application, was used to analyze the transcribed data collected during the interview. Dedoose performed a thematic analysis of the discussions. The codes were displayed as words, comments, and graphic representations, which were exported into MSWord artifacts and imported into chapter 5 of my study.

Issues of Trustworthiness

Credibility

Several characteristics determine the trustworthiness of a study. Reliability, validity, plausibility, generalizability, and others lend support to whether experts see an investigation as contributing to the field. In my case, my study must be able to contribute to the body of literature in the field of instructional technology. The credibility of my research is just one criterion for success in this area. A way in which I addressed this

issue in the data collection phase was I conducted interviews until data saturation was reached.

Following the recommendations of Creswell and Poth (2016) regarding qualitative research design, I made sure I was careful "not to shape findings in a particular direction" (p. 252). I wanted my study to maintain credibility and be used in future research. I also made every effort to have a believable and appropriate analysis regarding the level of agreement between participants (Yin, 2017) and that there was no perceived power differential between participants and me as the researcher. For me, it was one of the essential considerations in assessing the extent to which my qualitative research study is trustworthy.

Transferability

The transferability of a research finding is the extent to which it could be applied in other contexts and studies (Mills, 2000; Yin, 2017). This is equivalent to generalizability and external validity. Transferability outlines a brief history of the term and its successors, a discussion of essential aspects of transferability as it applied to action research, and an account of the strategies an action researcher or other researcher adopted to increase transferability. Qualitative research is, by nature, contextualized (Patton, 2015; Yin, 2017). However, transferability in qualitative research can be supported by detailed explanations of the study context. For example, my study included details of the work-space context, such as Zoom location. It established virtual class norms the teacher had for setting up and conducting online instruction. The home-life preparedness was shared with me during the study.

Conducting a study during a pandemic provided context. The COVID-19 pandemic had affected every aspect of the lives of all members of the educational community. This study incorporated open-ended interview questions and allowed participants to share details of personal and professional challenges of teaching remotely during the pandemic. The data collected considered teaching remotely from home. The data collected allowed me to check the transferability of events and experiences, given there was no access restriction due to distance, location, or time.

Research quality is an essential precursor of transferability. A lack of confidence in the findings of a study inhibits their use elsewhere. A necessary strategy for achieving quality and transferability is to pay attention to what is happening and draw on outside sources of information to help define the boundary within which findings may apply (Miller et al., 2021, p.2). A wide variety of relevant literature provided an opportunity to draw from existing communities of practice and networks of people with similar or overlapping interests.

The primary recruitment strategy used was an infographic posted on manager-approved professional teachers' group Facebook and Twitter feeds and accessible via an approved post from my professional Facebook and Twitter page. This was done to increase the chances of being viewed by active teacher members. Knowing the potential to encounter imposters when using social media platforms, I sought approval to join. I also completed public searches directly to LinkedIn. The primary data collection and analysis strategy used in the for my study asked for participants to consider their own experiences with teaching remotely during the pandemic. I used the interview transcripts

to exhaustively conducted four rounds of coding, and to have a trustworthy colleague with expertise in gathering research data serve as a mentor, make sure I was aligning the interview questions, using the most effective data collection and analysis tools to align with the research questions and the purpose of the study, to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic, with varying levels of skill and experience teaching remotely.

Dependability

Dependability in a qualitative study recognizes the research context is evolving, and it cannot be understood entirely at a singular moment in time (Mills, 2000; Yin, 2017). Dependability accounted for these issues by the selection of relevant methodologies. As for reliability, I conducted the study with diligence, so I could challenge the findings or question their transferability. First, I followed the procedure outlined in the methodology section of this chapter, which describes participant selection logic, instrumentation, and data collection and analysis plan. In addition, the data collected was secured on my computer. I confirmed with the participants that they understood the interview questions. Furthermore, I continued to review current literature, as it was evolving, as I conducted the study to check for replication of similar studies. I remained aware of what was present on the research yielding similar results. Likewise, in my study I supplied adequate and relevant methodological information to eventually enable others to replicate the study.

Confirmability

Mills (2000) said confirmability can be easily reached if the research shows an understanding of a phenomenon from the perspective of the research participants. Yin (2017) said an essential qualitative inquiry is the means to understand people's views of their experiences. To establish confirmability, I utilized strategies such as reflexivity by clearly describing how data were collected and analyzed and asking participants to review the interview guide and a summary of the interview to determine whether they interpreted the interview questions appropriately. I made certain my interpretations were consistent with their perceptions.

Ethical Procedures

I received IRB approval before contacting study participants or collecting data. Only after the IRB approval did I work to disseminate the participation invitation to teachers using social media platforms. It was only after prospective participants voluntarily showed interest in participating, and completed the pre-determination of eligibility questions, were they able to access the online consent form to confirm with the words "I consent" as an electronic signature. Ethical procedures were following in my study as defined by Kaliber (2019), who said to “strive to defend and respect the rights of study participants as essential components of any research study”.

Once I received a signed consent form, I showed due diligence by limiting data exchange and communication between participants myself. I kept the names of the participants confidential. Potential identifying information was removed from all data collection tools and all communications. I used private application accounts to conduct

and record interviews. I collected participant information using a password-protected Google account. I saved all interview recordings and transcripts on a password-protected private laptop and in a secure location online; these will be kept for five years after the study concluded. Additional copies of recordings and reflection notes have been destroyed. All recordings and transcripts will be destroyed five years after the study's conclusion.

The pursuit of accurate findings required honest engagement from participants, which in turn needed them not to fear professional retaliation, negative publicity, or loss of support. Thus, masking the name of the participant, as well as the organization's name, assisted in obtaining honest responses and engagement from participants and upholds the study's integrity (Mills, 2000; Yin, 2017). Conducting a study within one's own work or living environment could have presented an ethical issue, however, due to the pandemic, and my choice of recruiting nationally, there was no direct relationship that existed. All direct colleagues or co-teaching staff were excluded from participating in my study.

Summary

Chapter 3 provided a detailed discussion of the methods for this study, beginning with a description of data collection approaches selected to understand the technological and pedagogical challenges for K-12 teachers as they taught remotely during the COVID-19 pandemic. This included the research design and rationale, my role as the researcher, and procedures for participant selection, instrumentation, recruitment, participation, data collection, and data analysis. This chapter concluded with strategies for ensuring

trustworthiness and ethical considerations. In Chapter 4, I present the study findings that emerged from the data collection and analysis.

Chapter 4: Results

The purpose of this basic qualitative study was to explore perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. The central research questions for this study were:

Research Question 1: What did K-12 teachers perceive were the technological challenges of teaching remotely during the COVID-19 pandemic?

Research Question 2: What did K-12 teachers perceive were the pedagogical challenges of teaching remotely during the COVID-19 pandemic?

In this chapter, I discuss the study setting, demographics, data collection, data analysis, evidence of trustworthiness, results, and provide a summary.

Setting

The setting for this study was a cross-section of K-12 teachers from various regions of the United States who agreed to have an audio recorded Zoom interview to share their experiences teaching remotely the first year of the pandemic. For this study, the period of remote instruction ranged from 9 to 12 months, starting with April 2020. Participants for my study represented urban and rural, public and private, elementary, middle, and high school, special education, ESOL, English, math, technology, and music teachers. Factors influencing the results of my study may have included each school district's handling of the pandemic. In addition, participants of contrasting education landscapes: rural versus urban, highly funded versus struggling, public versus private, or

technology-invested versus traditional face-to-face schools, may have had different experiences.

Demographics

The sample population represented teachers of elementary, middle, and high school levels with varying years of teaching experience between 1 and 20 years. All participants taught remotely during the pandemic. My study addressed teachers' experiences immersed in remote instruction for a full academic year when many were not trained to teach in a remote learning environment. The sample represented teachers from various regions of the United States who were teaching remotely during the pandemic. All the participants taught remotely during the COVID-19 pandemic.

Nine participants were public school teachers, two taught in a private school and another in an alternative high school setting. Seven of the participants were female. Five of the participants were male. Two of the female participants were special education teachers, one co-taught in an elementary class where 50% of the students had individualized education plans (IEPs)—the other special education teacher co-taught high school English. A third female participant taught bilingual 2nd grade in a rural school. A fourth taught middle school English Language Arts. A fifth female participant taught 2nd grade in a large Title I school district in the southeast where the student population was primarily African American and Hispanic.

Two female participants taught high school, one English and one math, in very diverse, heavily populated school districts in the northeast. Two of the male participants taught high school technology education. One male taught technology education in an

alternative high school during the pandemic. Another male teacher taught high school Spanish. Two male participants, one music and one math, taught in private schools. More than half of the participants reported using technology in the classroom before the pandemic. Table 3 shows the in-depth demographics of participants in this study.

Table 3

Demographic Information on the Participants

Gender	Subject	U.S. Region	Level	Participant #
Female	Special Education	Northeast	High	2
Female	English	Northeast	Middle	5
Female	Bilingual 2nd grade	Midwest	Elementary	6
Female	Math	Northeast	High	9
Female	2nd grade, Title I school	Northeast	Elementary	8
Female	Special Education	Northeast	Elementary	1
Female	English	Northeast	High	3
Male	Spanish III	Northeast	High	10
Male	Math	Northeast	Middle	11
Male	Technology Education	Southeast	High	7
Male	Technology Education	Northeast	High	4
Male	Music	Southeast	High	12

Data Collection

Semistructured interviews, one per participant, were used to collect data. Interviews were conducted remotely since the United States was still experiencing the pandemic. The location was virtual using zoom web conferencing. The number of participants for which data was collected was 12. Participant interviews were numbered accordingly. Interviews ranged between 30 and 45 minutes. I averaged two interviews per week over 6 weeks. Extensive reflection notes were taken on each of the interviews. Zoom interviews were recorded and transcribed as excerpts in MS Word Pro and later

uploaded to Dedoose. I transcribed interview recordings involving Word Pro audio transcription App (Microsoft, Inc., 2014), a web-based application using an external audio device that was vital to getting a more accurate transcription. I used MS Word Pro to transcribe voice responses instead of relying on Zoom for voice output (internal microphone) and speech recognition (internal speaker), eliminating bandwidth and internal processing concerns. Interviews were recorded on Zoom. I could listen to the recordings later during the audio play back transcription process. MS Word Pro has been used extensively in qualitative research for dictation and transcription due to the accuracy of the voice-to-text feature (Hart & Achterman, 2017).

I took reflective notes during and following each interview. I sent a copy of each transcript to each participant for member checking to review for accuracy, as described in Chapter 3. I reviewed the transcripts, made minor grammatical and spelling corrections, and edited mechanical errors such as duplicate words and run-on sentences created during the speech recognition process before uploading them to Dedoose. Afterward, I uploaded the Word documents to Dedoose and assigned pseudonyms to participants (e.g., P1, P2, P3, …). In addition, Dedoose allowed me to assign specific ‘descriptors’ to P1-12 such as gender, subject taught, location, and school demographics.

I encountered a setback while I was setting up to begin interviews with participants for the study. I had a quick return on my first request for participation. Interviews were scheduled between November 2021 and January. Walden University IRB approved my initial request to conduct a study with teachers, approval number 11-12-21-0084095; recruitment started November 20, 2021. Initial communication began in

the form of emails to teachers from my Walden student email, letting them know I was a graduate student conducting a study for program completion. The initial recruitment targeted K-12 teachers in several school districts in one state in the northeastern region of the United States. A had spent countless hours copying and pasting email addresses that were found on the statewide public-school websites into a mass email to all. The issue arose, however, when I was contacted by an administrative office of one of the school districts requesting that I stop recruiting participants and begin a process to request approval. I put scheduling interviews on hold and immediately sought guidance from my committee chair.

Although I had received Walden IRB approval initially on the use of emails gathered from a public website, I was told by the administrative office of the school district to apply to the administrative office for permission to conduct a study on their teachers. I was instructed by my chair to immediately shut down recruitment and seek guidance from the IRB. My decision also included contacting selected candidates to inform them that I had chosen to start my recruitment process again, this time via social media to any K-12 teacher in the United States. I notified the IRB and requested approval to recruit teachers nationally using social media independent of a school district. I included qualifying teachers who responded to the request for participants via social media.

The approval to conduct a study on teachers around the United States was granted mid-December 2021, shortly before the winter break. Nationwide recruitment via Facebook and Twitter, later adding LinkedIn and the Walden ‘Request for Participants’

graduate studies webpage, commenced in January 2022. Interviews of participants at the national level took place from January 20 to March 16, 2022. Data transcription started in early March and was completed on April 18, 2022.

Data Analysis

Through this study, I understood the technological and pedagogical challenges for K-12 teachers as they taught remotely during the COVID-19 pandemic with varying skill levels and experience with remote instruction. Interview questions 2-6 were specific to challenges with technology. Interview questions 7-10 were specific to teachers' experiences and challenges with pedagogy (issues with teaching remotely, preparing to meet student needs, and decisions they made individually and with other teachers while implementing remote instruction). I used four rounds of coding: in vivo, a priori, double coding, and constant comparisons to show themes that emerged from previous coding methods. In vivo codes were derived directly from the transcription of participant responses to the interview questions.

A priori codes aligned with interview protocol and questions, which allowed me to focus on technological and pedagogical challenges for teachers who taught remotely during the pandemic (Elliot, V., 2018). I developed a codebook in Dedoose for the two key research questions. All participants were asked the same questions in the interview protocol and guide. The differences in time for each interview were based on participants' responses. Elementary teachers P1, P6, and P8 detailed accounts of their challenges with technology, while high school teachers P2, P3, P9, and P10 were more concise about the impact of remote instruction on student engagement and teachers having limited time to

plan. All grade level teachers reported the challenges being magnified for ESOL students and students with disabilities.

I began with Interview Question 1 which asked each participant to describe a typical day in the classroom before the pandemic and, because of the switch to remote: 'what would you have been doing?', 'what would your students be doing?', 'what changed during the pandemic?', and 'how did your routines differ pre and post pandemic?' While conducting data analysis, I repeatedly referenced the code book to ensure I assigned the proper code to an excerpt and words within the excerpt, adjusting how I coded as needed. IQs 2-6 were specific to teachers' experiences and challenges with technology while implementing remote instruction during the pandemic. IQs 7-10 were specific to teachers' experiences and challenges with pedagogy teaching remotely, preparing to meet student needs, and the decisions they made individually and with other teachers while implementing remote instruction.

Data analysis started with detailed transcript review followed by a priori coding of excerpt data. I used member-checking to support accuracy in transcribing the interviews (Williams & Moser, 2019). Once transcripts were emailed to each participant to check for accuracy, I used Dedoose (Dedoose Inc., 2018) coding and analysis, a cloud-based application, to analyze transcripts. The central research questions focused on technological (RQ1) and pedagogical (RQ2) challenges for teachers required to teach remotely during the COVID-19 pandemic. Participant demographics were assigned as descriptors. Coding was completed considering the two research questions, the interview and sub questions, referred to as IQs and SQs. With the use of Dedoose, I performed

several rounds of analysis of assigned codes using excerpts of participants to the IQs and SQs.

Round 1 Coding: In Vivo

Round one coding included in vivo coding. This type of coding represented demographic information and direct quotes from participants. Words, phrases, and extended excerpts were extracted from interview transcripts and coded for analysis across data from participants. Moving from in vivo to a priori coding allowed the opportunity to analyze this data and code by code co-occurrence across groups using a constant comparison coding technique (Williams & Moser 2019). Specific codes used were teacher grade level, subject, teacher gender, and the state where the teacher resided during COVID-19 remote instruction.

Round 2 Coding: a Priori

When I initially started Round 2 data analysis, I used Dedoose to code 232 text excerpts related to 26 a priori codes aligned with the research questions and interview guide to looking for emergent codes utilizing constant-comparison coding. While attempting to analyze the emergent codes within the platform, I found it easier to review the downloaded Excel spreadsheet data from reports I requested in Dedoose. I created the codebook via a priori of challenges with technology (see Appendix A) and pedagogical challenges (see Appendix B). I created parent a priori codes (Elliot, 2018) based on RQ1 and RQ2, technological and pedagogical challenges.

A priori subcodes unique to IQs for RQ1 were tech challenges during the pandemic, teaching students remotely, T(technology) rapid remote instruction factor,

technology use with students, and tech use with other teachers. A priori subcodes unique to IQs for RQ2 were planning and prep challenges, P (pedagogy)-rapid remote instruction factor, interactions with students, and prep work with other teachers. A third branch of sub (child) codes was used as identifiers for categories within the coding system: any student, ESOL, students with accommodations, prior tech knowledge/skills student, prior tech knowledge/skills teacher, student engagement with technology, and student engagement with peers.

With yet another round of coding, double coding, I was able to see themes emerging from patterns such as the rapid remote factors and early technology and pedagogical challenges for teachers, as they became key data points for a fourth round of coding, constant comparison coding, across RQ1 and RQ2. The numbers in the first column of the codebook show the parent and child codes for the individual interview questions RQ1 represented the challenges with technology during COVID-19. Subcodes two and three represent sub questions from the interview guide to dive deeper into specific challenges with technology.

A statement from P8, “English language learners’ growth is made in the classroom when they're able to interact with peers, and we could model things,” was coded as challenges with student engagement for ESOL students. P6 statements of “bilingual attendance was about 40 percent” and “even with school-issued Chromebooks, families didn't have Internet” were coded as technology challenges and rapid remote instruction with elementary ESOL students. From double coding and creating

spreadsheets to compare the transcripts script data across participants, more prominent themes emerged as well.

Round 3 Coding: Patterns

Using the 232 excerpts and 704 code applications in this third round of coding, double coding considered the lengthy timeline of remote instruction. Round 3 coding showed the parent code and sub codes of RQ1 manifesting as challenges for RQ2. Round 3, Double coding represented three main patterns of responses: 'issues connecting with technology,' 'issues connecting with students and teachers, and 'issues with engagement and learning.' RQ2 disrupted established pedagogy in the transition to emergency remote learning. I incorporated interview questions with sub questions specific to the timeline on the use of technology over 12 months, encompassing the last three months of the school year 2020, the summer of 2020, and for some schools, the first six months of the following school year 2021, and for others, the entire academic year 2021.

Participants reported a lack of student attendance and engagement, particularly students with limited English proficiency, students of color, and students with special needs requiring accommodations that were not readily available in a pandemic, severely limited interactions with the teacher due to challenges beyond the teachers' control. This was attributed to the pandemic and was coded as engagement and learning challenges. I could analyze data by double-coding and make constant comparisons of challenges with both technology (see Appendix C) and pedagogy (see Appendix D), considering some of the same groups, such as any students, ESOL, students with disabilities, and fellow teachers, across factors such as rapid remote instruction and timeline of the pandemic.

Students needing headsets and Chromebooks well as the need for teachers to make videos of the lesson to share in an asynchronous platform and exercising extended wait-time for technical assistance were double coded as ‘challenges connecting with technology’ (RQ1) and ‘challenges interacting with students’ (RQ2).

Table 4 shows the three emergent patterns from double coding the data collected on RQ1 with RQ2.

Table 4

Emergent Patterns for Double coded RQ1 with RQ2

A priori code	Issues connecting with technology	Problems connecting with students and teachers	Issues with engagement and learning
IQ1 - Teaching students remotely	WIFI, Connectivity	helping students troubleshoot	stressed, helpless, MH
IQ2 - Rapid remote instruction factor	need for technology support	elementary, middle, and high school level	overwhelmed, MH
IQ3 - Interactions with students	multiple kids online	multiple technology platforms use	Disengaged
IQ4 - Interactions with other teachers	broadband limits	teachers helping one another troubleshoot	limited experiences
IQ5 - Biggest technological challenges in first three months	technology restrictions placed by school	prior engagement	Relationships
SQ1 - Any Student	access, logins, passwords...	interactive technologies	Zoom fatigue
SQ2 - ESOL Students	immersive tools	WIFI, multiple users	language barriers
SQ3 – Students w IEP/504 needing accommodations	missing face-to-face interaction	1-1 support	Disconnected
Reflective Notes	Navigating the Challenges	helping parents troubleshoot	inequities of use and access

Students needing more specific technical support, hardware issues, and other challenges at home with getting online were coded as challenges with technology. P2 challenges with getting students to navigate to one resource independently were coded as challenges with technology. For example, “Some just shut down because it was just too much… they were disconnected from school” (P2) was coded as issues connecting with students.

Round 3 analysis allowed me to constantly compare challenges with technology considering some of the same groups, such as any student, ESOL, students with disabilities, and fellow teachers, across factors such as rapid remote instruction and a timeline of the pandemic, and at the same time double code with pedagogical challenges reported by teachers during COVID-19. Column one represents the parent and child codes for the interview questions, and the right columns represent each participant's state of residence. Further analysis was made by the teacher based on location to see if there were any like experiences for teachers by location.

Round 4: Themes

I examined responses of participants to RQ1 and interactions with students, the timeline of the remote instruction, teachers' preparedness, students' challenges to assessing student learning, and interactions with fellow teachers. I used these identifiers to examine RQ2 further. As a result of an analysis of data, four key themes emerged: teacher agency, inequities exposed during remote instruction, challenges to building relationships, and teacher praxis.

One apparent theme that emerged at the onset of the pandemic was *teacher agency*. For my study, I considered teacher agency as the capacity of teachers to act

purposefully and constructively to direct their growth. In my research, teacher agency was defined in terms of teaching remotely. It encompassed professional development achieved through meaningful and relevant activities for teachers themselves as learners particularly JTPD. My study considered the rapid remote teaching imposed upon teachers and that teacher agency was initiated to a limited degree with appropriate guidance as part of staff development (Amants et al., (2020).

As part of the data analysis, I used the theme teacher agency to categorize the patterns of codes and subcodes relating to RQ1 and RQ2, explicitly referring to participants' responses to their professional experiences learning to adjust to remote instruction throughout the pandemic. Teacher agency emerged from the codes of interactions with students, prep work with fellow teachers, prior use of technology, and technological challenges teaching remotely during the pandemic. The teacher agency theme emerged from the participants reporting on technology use without prior preparation and the school's attempts to provide them with JTPD. The challenges most participants responses agreed included challenges with establishing an online presence, difficulty sharing resources, and not having face to face interactions.

The participants reported the challenges brought on by the pandemic limited their ability to demonstrate creative thinking and work collaboratively. Many said they felt as though they were initially not a part of a CoP. P5 reported the constant challenge with teaching was "multiple children online" from the same family, "doing school," and the "limitations it caused to them using Zoom with broadband limits" and with the background noise. P6 stated, "My students couldn't hear me all the time." As the CoP

model became a standard in schools (Miller et al., 2021) and was adopted and implemented as remote learning guidance from state education agencies (Reich et al., 2020). By the fall of the 2021 school year, students were switched back to face-to-face. Others were accepted into newly created virtual schools and online courses provided by the school district and connected to a local school.

Another theme was *inequities exposed by the pandemic*. This included codes of responses by the participants on lack of Wi-Fi access, non-English speaking parents, limited English-speaking students, limitations of students in low-income areas to have access to needed technology, students with special needs unable to engage regularly in remote instruction, and students with learning and attendance issues before shutdowns not attending zoom class at all. Responses such as 'we tried to gather up all the computers we could get out to the kids and they didn't have internet" (P9), "not having or being accessible to the immersive tool which enables translation" (P4), and "getting jetpacks out which did not work" (P6) were coded as inequities exposed by the pandemic. "Many of my students learn better having interactions with peers because a lot of them have autism and there are social interactions," and "breakout rooms were not something I did because of the dynamics of the students in my classes" (both P3) were coded as inequities exposed by the pandemic.

Another theme was *challenges to building relationships.* Codes of inconsistent and no attendance, difficulty implementing interventions and small groups to work on differentiated lessons and activities (P6), lack of student stamina (P11), and challenges to student focus and attention online (all) were used to develop the theme of challenges to

building relationships. For example, “I think that stamina was a huge concern at the beginning of the year” and “I was still seeing it further into the year” (P1) were coded as challenges to building relationships with students. Teacher challenges with interacting with students and learning assessments were coded as challenges to building relationships.

The last theme identified was *teacher praxis during the pandemic*. Patterns of challenges for teachers and students as reported by participants I coded as knowledge and experience gained by teachers along the timeline of remote instruction. This eventually emerged as the fourth and final theme of ‘teacher praxis directly related to the experience of teaching remotely during the pandemic. Praxis, in this instance, included participants’ increased awareness of social-emotional well-being of students and self, of anti-racism and anti-bias practices, the value of technology use on student learning, and the seeing of how the disparities for certain populations informed their teaching practices. For example, “Trying the same amount of impact and influence with less interaction” and “teaching and taking care of children and encouraging those children to stay on top of their coursework” (both P4) were coded as teacher praxis. “I’m like an old-school teacher,” and “I like to teach with direct instruction to students.” All those new technologies… I was not used to it” (P10) were coded as teacher praxis. Responses transitioning from “no real instruction was going on because we were making sure everyone has some type of device” (P9) to “reducing the number of days online” and “making them shorter helped with screen fatigue” (P11), and eventually participants describing how they were collaborating with fellow teachers using “Seesaw” (P3)

"Peardeck" (P5), "Schoology" (P10), as well as other technologies, were coded as teacher praxis.

Evidence of Trustworthiness

Trustworthiness allows other researchers to determine the credibility, transferability, and dependability of the study to its findings, so it is possible to transfer the results to further studies and validates the research in the field (Patton, 2015). Showing evidence of trustworthiness is why a researcher must maintain transparency about all aspects of the study, from recruitment and participation processes, demographics and settings of the participants, and unforeseen obstacles or challenges encountered in any phase of the study. The study must show I remained objective and forthcoming about the research findings, the intent for conducting the study, and any personal interest or connection to the study.

Credibility

As I outlined in chapter 3, credibility was just one criterion for success for me in establishing whether my study was trustworthy and would be seen as contributing to the field of instructional technology, particularly in grades K-12. I conducted interviews until data saturation was reached and ensured I was careful "not to shape findings in a particular direction" (Creswell & Poth, 2016, p. 252). I wanted my study to maintain credibility and be used in future research, so during the data collection phase, I conducted interviews until data saturation was reached which was evident with interview number nine. However, I continued with the interviews until I completed the planned twelve interviews.

I also deliberately collected and coded the data by having a structured set of interview questions in the guide. Credibility was supported using tables representing demographic data, level one, and level analysis. Reflective note taking provided neutrality and clarity to the data collected in this qualitative study. Finally, I was able to confirm the credibility of the contents of each transcript of an interview using member-checks, the use of reflexive notetaking, and the study peer review by a trusted colleague with a doctoral degree. During the data analysis process, I saturated the data by continuously looking for duplication of responses to each interview question using an exhaustive process.

By taking notes on each interview and having discussions with a trusted peer on my processes for interpreting and reporting on the data, I reflected on each approach's purpose in addressing the research questions. Gray et al. (2020) recommended a researcher develop interviewing strategies for using Zoom. When scheduling each interview, I communicated the need for a private, quiet space to log into our Zoom session outlined in the interview guide. Each participant followed these instructions Kaliber (2017). Purposeful sampling (Naderifar et al., 2020) was accomplished by using online self-qualifying questions to eliminate anyone not eligible to be a part of the study because they were not teaching remotely or were not a certified teacher during the pandemic. I maintained a code book in the data analytics tool I used, Dedoose, which allowed me to add emergent codes from the excerpts and texts.

Transferability

While analyzing and interpreting the data, I deliberately attempted to use detailed, thick descriptions to support clear illustrations of the findings for it to be applied in other contexts and studies (Mills, 2000; Yin, 2017). Interviewing teachers from around the United States representing multiple grade levels in K-12, and teaching in various content areas, gave generalizability and external validity to the study. Detailed explanations of the study context supported transferability in this qualitative study. For example, my study included detailed descriptions of the context of teaching during a pandemic. The first question participants were asked in the interview was to describe a typical class period before the pandemic and then to describe teaching the same class during the pandemic. Conducting a study in the middle of a pandemic provided context. A pandemic has affected every aspect of the lives of all members of the educational community. I offered detailed and rich descriptions of the participants and their settings, the type of school district, what state they taught in, and a general description of student demographics.

Dependability

To increase my study's dependability, I conducted it with diligence and methodically to leave very little chance of challenging the findings or questioning their transferability. I gained quite a bit of insight into study dependability from reading Patton (2015), which said, “qualitative inquiry is precious for identifying unintended consequences” (p. 10). This was a reality of conducting a study in the middle of a global pandemic.

First, I followed the procedure outlined in the methodology section of this chapter, which described participant selection logic, instrumentation, and data collection and analysis plan. In addition, the data collected was secured on my computer. I confirmed with the participants they understood the interview questions. Furthermore, I continued to review the current literature while conducting the study to check for replication of similar studies so I would be current on the research which yielded identical results. The goal was to present a study that could be supported by the literature and have the potential to be replicated by future studies.

Confirmability

Mills (2000) and Yin (2017) remind us that the way to validate a qualitative study is to allow an opportunity for those being studied to give their perspective of the experience. This is done formally in the collection of data or informally as part of the reflection on the part of the researcher throughout the process. My study achieved this by clearly describing how data were collected and analyzed, along with taking time to ask participants to review the interview guide and a summary of the interview to determine whether they interpreted the interview questions appropriately and that my interpretations were consistent with teacher perceptions.

Results

The results of my study involved a synthesis of the data in a series of steps which allowed me to detect patterns and themes in participant responses to the interview questions. Every interview was conducted consistent with the process outlined in my guide, so each participant addressed the same questions. Audio recorded interview data

were transcribed and synthesized to account for codes categorized by interview questions. Codes that emerged were aligned with the research question and sub-questions. Themes were identified and resulted considering the conceptual framework of this study.

Central Research Questions

Central research questions for the study were: What did K-12 teachers perceive were the technological challenges of teaching remotely during the COVID-19 pandemic? and, What did K-12 teachers perceive were the pedagogical challenges of teaching remotely during the COVID-19 pandemic? I present the findings related to these key research questions in accordance with the four emergent themes of teacher agency, inequities exposed by the pandemic, challenges to building relationships, and teacher praxis.

Theme 1: Teacher Agency

It was important to delineate a timeline to show how participants were navigating the changes being implemented by the school district and by the individual schools during the 9–12-month period of remote instruction and their level of use, comfort, and adoption of technology. Doing so allowed me to uncover how participants' experiences shed light on the vital theme of *teacher agency.* For my study, I adopt a general interpretation provided by Imants et al. (2020) in which teacher agency is "associated with individuals who, alone or in groups, in each situation, make decisions, take initiatives, act proactively rather than reactively, and deliberately strive and function to reach a certain end" (p. 7).

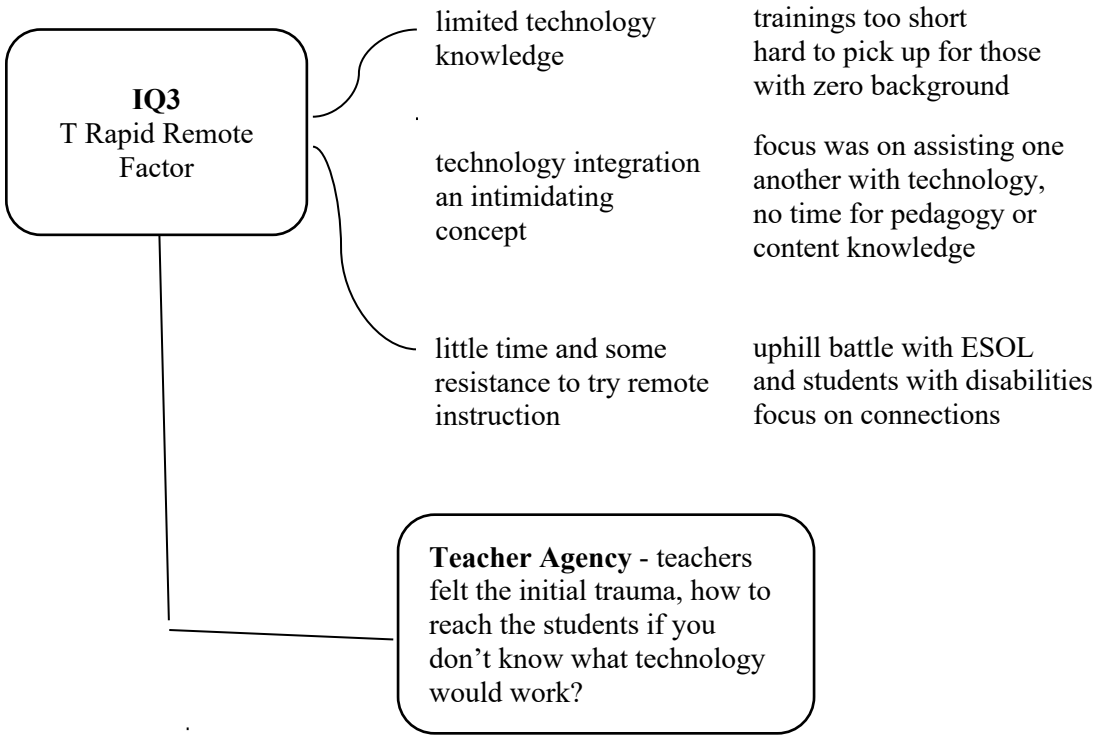
All participants reported meeting with fellow teachers in Zoom and shared how they used the online platform for the asynchronous posting of assignments and drop box for student submissions. P2 and P3 utilized discussion boards and online calendars and emailed students regularly. “We would do these check ins, and then there would be office hours” (P10). P12, the music teacher, remembered, “I don’t think anybody thought we would be out of school as long as we were, so honestly and very truthfully, I went into it like, well, it’s going to be like a break.” P7, the technology teacher, indicated, “We had to be reaching out to many kids.

During the first three months of remote instruction in the Spring of 2020, teaching was disrupted in such an abrupt manner and continuation of learning meant adopting a school schedule to accommodate virtual instruction. Not having all five days online was the decision of most schools. P9 indicated it was “sort of like an A and B Day where you had certain blocks that students were expected to come online to class.” Wednesdays were an optional check in”, noting students had learned quickly which days were optional.

It was frustrating for high school teachers, who still had to award the passing grade “whether students attended or not” (P10). This was a deterrent to prioritizing rigor and an avenue for students to pass a class with little effort. Having been thrust into rapid remote instruction had a negating impact on teacher agency at the onset of the pandemic. Figure 3 shows the challenges teachers had due to the rapid remote factor.

Figure 3

Emergent Theme 1 - Teacher Agency
RQ2, IQ7 Doubled Coded using RQ1-IQ3,



RQ2-interview question 10 considered the duration of remote instruction from the end of 2020, the summer of 2020, and the 2020-2021 academic school year. The beginning of remote instruction did not occur until several weeks into school shutdowns. P11 remembered it taking even a little longer to implement, "I remember them saying that I'm getting an email stating we are going to be shutting down schools." P11 and P12 commented that in the first couple of months leading into the summer, the "technological infrastructure wasn't there," meaning there was no universal use of a specific learning management system.

As a result of administrative decisions, schools were told to use the same learning management system for all courses, and shell courses were pushed out to participants using Canvas. Multiple participants reported spending considerable time preparing for the students and using zoom to help one another navigate the challenges and "walk each other through it" (P1, 3, 5, 9, 11, and 12). Participant 9 reported, "becoming familiar with a school networking system which had been introduced just before the pandemic was compounded by learning how to manage additional or revised systems mandated to implement remote instruction." Participants reported it was impossible to prepare students to thoroughly learn the content and skills in their classes using remote instruction. This significantly affected participants' mental health, resulting in many questioning their futures in education.

All participants initially reported on technology challenges as the most important at the beginning of rapid remote instruction. First, P1,2,4,8,10, and 12 stated that remote instruction did not take place right away, noting for 2-4 weeks following school shutdowns, there was little to no instruction. Secondly, the data showed teachers were mostly concerned about being immersed in technology with little engagement from students and the uncertainty of how to mediate it. More than half of the participants reported using technology in the classroom before the pandemic. Only one teacher was already an online teacher before the pandemic. Several concerns were alleviated as schools remained remote; however, there remained lingering effects on student engagement.

The abrupt switch to remote instruction and the disconnects from the school heightened teacher concern about expectations for delivering instruction, connecting with students, and a timeline on when and how to implement them. (P9) “We’re dealing with the pandemic, and you throw these new uhm technology platforms and apps and then requirements.” (P8) I don’t think they thought this through, about much it’s going to take to prepare for 90,000 students by next week”. Further into the pandemic, however, participants reported expectations for the use of technology were better communicated. The research questions addressed by codes for the emergent theme of ‘teacher agency’ were RQ1, IQs 3 and 6, as well as RQ2, IQs 7 and 10.

For RQ1, participants indicated they were initially challenged, having been switched to rapid remote instruction with little time to prepare and uncertainty about expectations. Participants said an abrupt immersion was most challenging in leveraging technology and expectations for student engagement. All participants reported remote instruction did not take place right away, noting that there was little to no education for 2-4 weeks following school shutdowns. Interview SQs were necessary for me to delineate a timeline of when participants perceived these challenges existed over 12 months. Although having been abruptly forced to adopt a new modality and taking on challenges with variables that were often beyond their control while managing their personal experiences during a pandemic, participants reported the well-being of students remained their focus.

The impacts of the pandemic forced a need to build their capacity for purposeful professional growth. Teacher agency became a key theme. It did not come immediately,

as the switch to rapid remote instruction (RQ1) challenges with technology created a disconnect between teachers and schools. Teachers initially had anxieties and frustrations with switching abruptly to rapid remote instruction. As teachers became familiar with technology, navigating the pandemic became somewhat manageable.

Theme 2: Inequities Exposed by the Pandemic

The pandemic exposed the stark inequities in education, having already had a socioeconomic divide. P8, a teacher in a school whose demographic was 80% African American, and free and reduced meals, families did not have resources for online instruction and needed them delivered to their homes. P8 said, “mailing things home took my own money.” P5, an English teacher for primarily middle school ESOL students from central and south America, reported using “my finances to pay for online orders at Office Depot to print packets.”

Schools provided “curbside pickup of school issued Chromebooks for students” (P1, P4, and P9), and P8 indicated that “students also received hot spots.” P9 reported her students “looked forward to getting something in the mail from their teacher.” P4 reported the biggest problem was ‘when the Chromebooks broke, there was not a good set up within the district for how we were going to handle this.’ P8 said her students had similar issues. ‘You would go to power it (the Chromebook), and it would be dead, and they (the families, often of multiple school-aged children), had a lot of Wi-Fi issues.”

The “problems with hardware and connectivity” (P2) was indicated in low-income areas. P1 said in the zoom session when cameras were on, she could see into the students’ homes and how they lived.” Some children lived in cramped living spaces”

(P1). “Several of my students bounced around to different homes” (P6). Several participants commented that older students had to assume the role of parent to younger siblings when their parents went to work. Students in other areas were prepared with their technology (P12) and had “no issues with connectivity to the internet at home” (P10). In most instances, students and families needed a connection with a school, the teachers, counselors, and administrators, as many lost loved ones during the pandemic. P8 reported students “had not grieved the losses.” As for technological challenges for teaching remotely during the COVID-19 pandemic, P9 and P10 said that “emergency models of instruction which had yet to be extensively vetted” presented “challenges for student participation and teacher instruction.” Participant 5 reported, “some teachers from the same school were using Google Classroom, and some were using Canvas.”

While four teachers out of 12 reported students pivoted more easily to online learning than the students in highly impacted schools, all participants felt remote learning for the first six months of the pandemic failed to engage students. Eleven out of the 12 participants observed students often showing signs of fatigue, being overwhelmed, and disengaged within online spaces. As for technical challenges and interactions with students with special needs requiring accommodations, participants could not tell if students were following along in Zoom or whether students were blocked from accessing specific technology that could assist in getting work done at home.

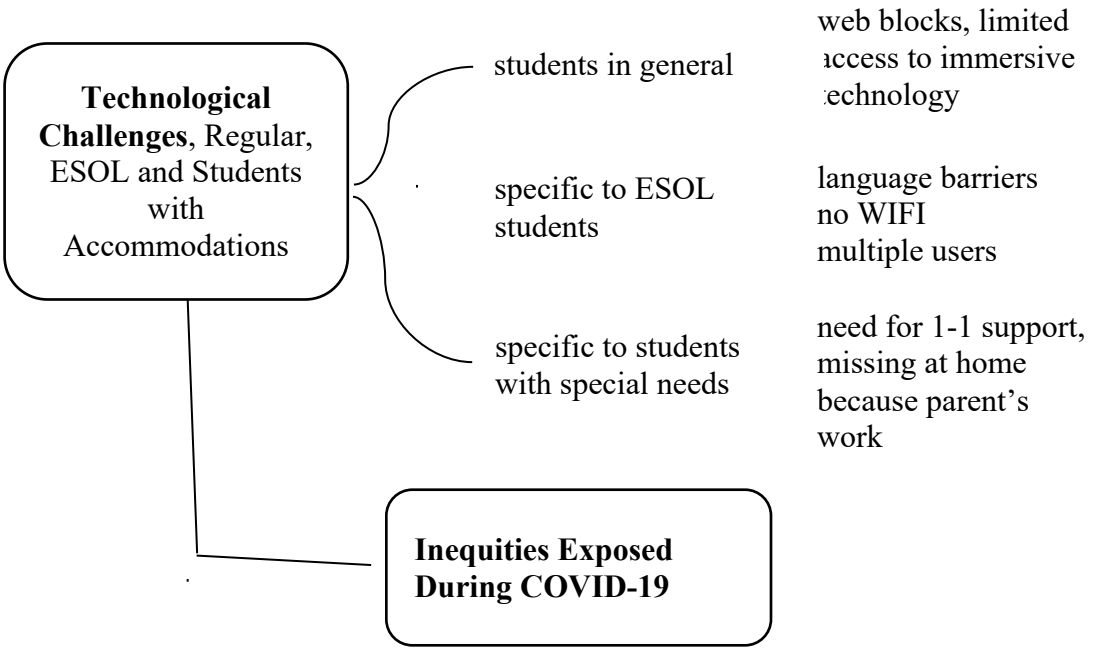
Figure 4 demonstrates patterns of specific challenges for teachers in supporting highly impacted student populations, further exposing technological and pedagogical

difficulties teachers had with little distance education experience teaching remotely during the COVID-19 pandemic.

The research questions addressed by codes for the emergent theme of 'inequities exposed by the pandemic' were RQ1, technology challenges-interview question 2, sub-questions 1-3, double coded for RQ2, and pedagogical considerations.

Figure 4

Emergent Theme 2 - Inequities Exposed by Pandemic
RQ1, IQ2-SQ 1-3, Double-coded for RQ2



As for technological challenges, several participants reported inconsistency in making connections with their students in Zoom because of technology issues at home beyond the participants' control.

As P7 reported, "students would drop out, and so they would lose out, and so they might be able to pop in, and they might not be able to come, which was a challenge I had

no control over." Participants 1, 4, and 7 reported in the home of the students and themselves, there were multiple individuals online "trying to engage in school." P4 said, "it was hard on the WIFI because 3-4 people were using it on zoom", and in a later statement, commented," you had all the noise so that they couldn't hear all the time."

From the data collected, information on hardware and WIFI hardships for students surfaced as the participants reported what they witnessed in zoom sessions while attempting to teach students. Many "black and brown students from low-income areas and students with disabilities were less likely to attend virtual classes or fully participate online" (P7), and according to P8 stated many districts eventually "loaned families the needed computers and WIFI hotspots.". P1 added, "quite a few students in my class did not have reliable WIFI connection." These severe limitations greatly impacted what teachers could do within an online, virtual environment. They were forced to plan differently.

It was evident to P4 that "the inequities for students existed before the pandemic," and the pandemic highlighted the need to address these inequities. P6 stated, "the technology challenges were magnified by language barriers." Additionally, P1 said, "challenges of having multiple siblings learning at home" accounted for "no student attendance in Zoom for most students," and it ultimately "affected student success in school."

P9 indicated she and other teachers "encouraged parents to come to the school and get the devices or to get the mobile WIFI boxes, but we ran out." Several participants reported that during this time, they relied on emails and phone communication with

teachers, parents, and older students who had cellular data and email access—understanding the inequities highlighted by the pandemic helped to answer RQ1 and RQ2 regarding the technological and pedagogical challenges for K-12 teachers in the United States during the COVID-19 pandemic.

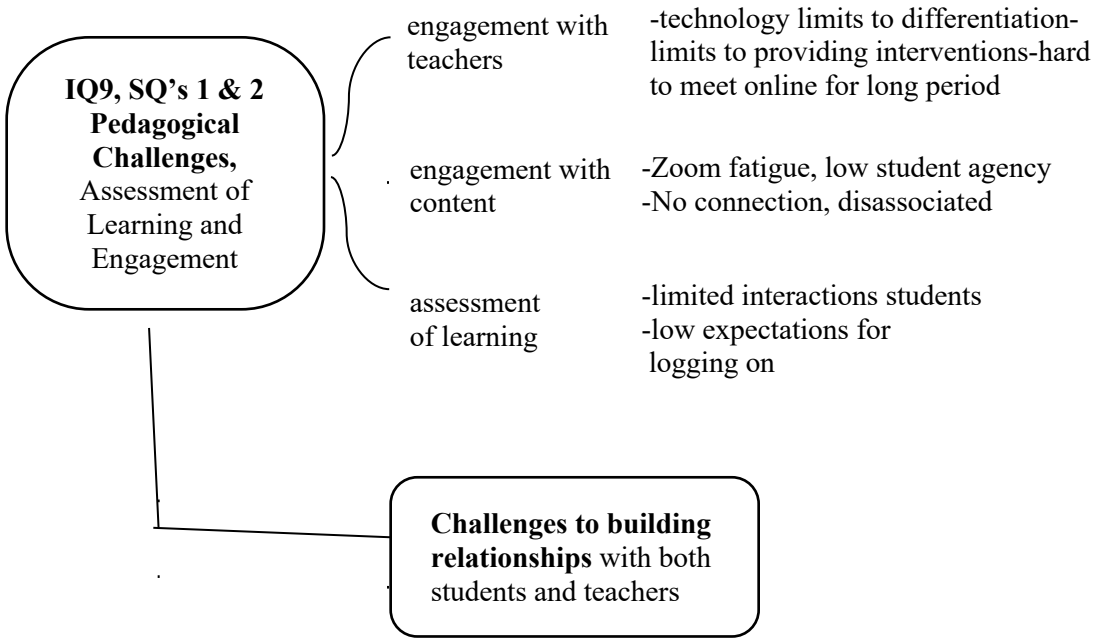
Theme 3: Relationships

Figure 5 shows how challenges with implementing the use of technology impacted relationship-building for teachers with both students and other teachers. Examining participants' responses to sub-questions coded as regular students, ESOL students, and students with disabilities, a key theme emerged – *challenges to building relationships*. P6 stated, “the pandemic taught me to cherish our relationships with our students.” Statements such as this response were coded as *challenges to building relationships*.

Faced with no student engagement on Zoom and students not completing work at home, P8 resorted to sending emails and leaving voicemail messages saying, “Hey, [student name], are you doing what you’re supposed to be doing?”

Figure 5

Emergent Theme 3 – Challenges Building Relationships



Responses from all participants except P11 indicated minimal opportunities to build the necessary relationships with students to sustain interaction, engagement, and interest and prioritize learning.

Figure 5 also describes the challenges for teachers trying to interact and nurture professional relationships with one another, having to convene virtually due to COVID-19. There were hardware and WIFI issues teachers experienced when trying to interact with students. There was a limited time to interact when they were expected to remain virtual for students throughout the week during the virtual instruction and check in hours. All participants pointed to the need to interact to stay connected, even if by phone (P6), with school and peers to complete just-in-time PD in remote instruction, even during year two of the pandemic. The research questions addressed using the codes of challenges in

building relationships with students were RQ1 and RQ2, relative to IQs on student interactions. As for the challenges for teachers in building relationships with fellow teachers, all participants commented on the high level of exhaustion referred to as 'Zoom fatigue' (P10) and the significant investments in time to prepare for online instruction that no one had time to connect regularly with colleagues.

The pandemic brought various personal and professional challenges for individuals, which prevented the regular interactions one might have had in school. Participants who were teachers of elementary students reported elementary students (P8) and ESOL students (P6) had to learn how to connect to Zoom. P3 said that Zoom was "something they (students) never heard of." P8 added, "how to log in to Zoom was a learning curve for the little ones." Participants subsequently felt some accomplishment if several students logged in and could remain for the entire session. Teachers generally said they would be fortunate if someone participated in Zoom breakouts or completed work in the asynchronous platform. Because most of each day was spent connecting with students via Zoom, most participants said they did not desire to go beyond the contracted workday for class or virtual check-ins. The teachers said they were exhausted. For their mental health, they disconnected from school as soon as the last student logged off or the presenter said goodbye in a PD meeting. For the teachers, it was a form of self-preservation.

One high school teacher (P9) described adjusting the mandate to teach remotely as "teachers having to modify and adapt" because then "you're still going to be held accountable in your teacher observations within this setting." Teachers of elementary

students felt a sense of defeat not being able to interact face-to-face with the students. P6 reported having separate zoom meetings to help parents troubleshoot, and P11 reported spending a lot of time in the evenings and on weekends trying to figure out how to support students.

At the onset of rapid remote instruction, there was little effort put into regular planning meetings with colleagues. P3 remembered the experience of "spending all day helping students and then trying to PLC when most of the time it was helping other teachers online was very tiring." Participants noted that during the first year, they did not. have regular content meetings. During the second year, participants recall having "countywide PLCS." Several participants remember teachers calling each other to discuss the PLC. However, one challenge regarding the use of technology and teacher interaction was sharing space and WIFI usage with other family members at home. P12 remembered the level of difficulty trying to have regular meetings.

The research questions addressed using the codes of challenges in building relationships with students were RQ1 and RQ2, relative to IQs on student interactions. The limited interactions and low expectations for logging on presented the most significant challenges for teachers in establishing a connection with students. Teachers reported students having no relationships and often disassociated from school altogether, providing no window of opportunity for engagement. Teachers observed that many students who did log into Zoom sessions quickly developed Zoom fatigue and low student agency, limiting teachers' ability to build relationships vital to nurturing student engagement and desire to learn. Having strong relationships is necessary for building trust

and being viewed by students as important in their learning process. Relationship building was greatly affected by long-term shutdowns due to the COVID-19 pandemic.

Theme 4: Teacher Praxis

The fourth and final theme that emerged was *teacher praxis*, the teachers' ability to measure how well they implemented instruction and how well they reached students. This proved to be difficult for participants immediately following school shutdowns. Many students and teachers were immersed in virtual instruction with little understanding of the expectations, and very few had prior training or experience (Ferdig et al., 2020). The use of rapid remote instruction included asynchronous online learning platforms, with classes conducted synchronously via web conferencing. Data collected on RQ1-SQ2 showed teachers often thought students knew more about learning platforms, online tools, and other technology than teachers. P6 and P8 admitted their elementary students had a greater knowledge of the use of technology than they did. While students had limited experience with web conferencing software and the accountability of interacting daily with an online learning platform, they were eager to try. P6 and P8 reported once the technology issues were handled, elementary students were logging in to Zoom and engaging with the teacher and content online.

Considering interactions and pedagogical decisions made during planning time with fellow teachers and gathering input from teachers on how they assessed student learning and their views on how to do so in a remote setting was crucial. Participants said they relied on feedback from other teachers. Participants also commented on the importance of highly structured meetings for reinforcing expectations. One thing most of

the participants commented on was the low-level expectations for students. “It [low expectations for student achievement] was just something that was expected” (P9). To meet student technology needs, many districts loaned equipment to families. Participants indicated, “there was no PD on how to assist families” (P2) and [expert] “technology assistance was not readily available over Zoom” (P4).

To measure how well they were doing with virtual instruction and how well they were reaching students in learning content [teacher praxis], participants say they used their Zoom interactions and asynchronous exchange of content and assignments. Participants who taught elementary level attributed the younger learner’s willingness to take on remote instruction to students having prior engagement with various interactive technologies in the classroom before the pandemic and a natural sense of curiosity for appearing in Zoom sessions and interacting with the teacher from a computer screen. IQ3, *prior knowledge*, sub codes, *elementary, middle school, and high school* showed a pattern of like responses to specific challenges with hardware, internet WIFI, the impact on student engagement with technology, and having to tackle these challenges remotely.

P2 reported one of the significant challenges was “taking all of the teaching materials you know we had planned to use for the remainder of the year and converting them to be technology friendly so that students can access them” and “that some of the activities you needed to do face to face because they did not fit the virtual format.” P6 commented, “between your breaks or whatever, you would be calling up your friends, you know, your colleagues”, and “we talked on FaceTime or WhatsApp.” P9 commented,

"I had to upload everything online and use Google Slides and other platforms like Desmos and Delta math." The most challenging areas for P9 were technology integration and adopting remote instruction pedagogy.

In my current study, teachers were at varying levels of technology adoption. Some were more comfortable implementing the curriculum online. For this study, I define praxis as performing what has been proven to be good teaching practice. Participants acknowledged they were stifled in performing what their job required them to do as teachers, teach children because of limited interactions with students in Zoom due to students not logging in. Additional challenges included getting students to submit assignments and the fact that teachers themselves had been abruptly immersed in online pedagogy. The frustration that resulted led teachers to question their abilities. For P1, it was a re-evaluation of the choice of profession.

Many of the participants felt they were operating on an island. Assessing success in planning and implementing meaningful instruction were "challenging due to the hardships in providing rapid instruction," (P2) responded, given the timeline of the pandemic. In addition, according to P3, the "vision and expectations for remote instruction were not properly communicated" from the district level to leaders and from leaders to staff. According to P9, non-uniformity of communications from higher ups made it "difficult to plan, implement and feel supported."

My study captured the essence of teaching during COVID-19 and teacher praxis as the collective response to organizational trauma and social emotional learning leading to teachers supporting each other and adopting a divide and conquer approach to planning

and lesson preparation. Such comments provided insight into participants' perceptions of their ability to implement virtual instruction and how well they reached students. By the second year of remote teaching, participants had a gradual sense of community from the support they received from one another, which resulted in a greater willingness to adopt the technology. Noticeable changes in pedagogical decisions and practice emerged.

Participants reported a wide range of emotions about their first year, with many unpleasant feelings being attributed to "lack of planning," (P4) and "stressors related to both health concerns and distance learning" (P12). When participants shared their year two experience, they referenced more pleasant feelings related to connections made with colleagues and students." For example, participants 6 and 8 stated that anytime they "interacted with students," they tried to gauge whether learning was happening and if students needed help with content or navigating the course. Teachers wanted to know if and how well they were delivering content, adequately enough for students. I coded these concerns as challenges for teachers concerning teacher praxis.

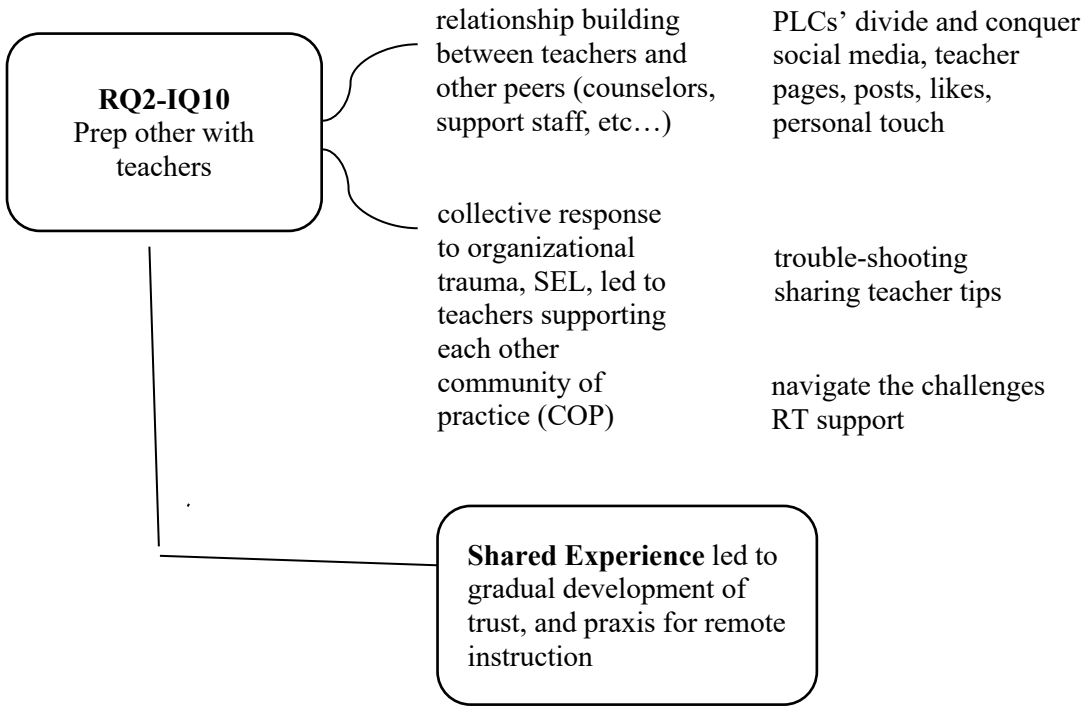
The limited connections participants said they had with the small number of the students logging in regularly (less than 50%) gave them a minimal amount of valuable information to make instructional decisions, adjustments to courses, and other information needed to gain an understanding of what was most important to students' well-being and success in school. This I coded as the theme of challenges to teacher praxis coded in RQ2. As for preparation with other teachers and teacher praxis, the collective response to organizational trauma and social emotional learning (SEL) led to teachers supporting each other and adopting a *divide and conquer* approach to planning

and lesson preparation. This included productive discussions with colleagues on the use of technologies deemed most engaging and some which allowed for scaffolding, differentiation, and quick learning assessment.

Some technology teachers reported sharing ideas on using social media, teacher pages, posts, likes, bitmoji, gifs, and applications students could use on their phones or Chromebook. All agreed they were interested in knowing what other teachers were using and often attempted to do the same. If the attempt was not successful, it was abandoned for something else. It was a time to develop a new pedagogy that included more use of technology.

Figure 6

Emergent Theme 4 - Teacher Praxis
RQ1-IQ6 Timeline of Tech Use, Double-coded with, RQ2-IQ10



The themes that emerged from careful data analysis addressed the challenges for teachers who have been emersed in rapid remote instruction with little experience, managed the technical challenges, and the implications to teachers teaching in a crisis.

Discrepant Cases

Three discrepant cases were found during the analysis of data. One participant responded to the challenges they were having getting students to interact remotely using technology. P9 said that even with technology disseminated for students to use, the black and brown students chose not to engage because of the predisposition to being in the category of 'highly impacted student.' Another discrepant case was where one participant responded to teachers' challenges with technology during rapid remote instruction. While all other participants indicated training did not come as quickly as they would have hoped. P4 said that for her, it did not come at all, even when the new school year commenced, and schools remained remote. The third discrepant case resulted in challenges with pedagogical decisions when planning with other teachers. P5 indicated he was not required to participate in a PLC with other teachers. He elected not to try and plan with other teachers because he felt his pedagogy for remote instruction was sound.

Summary

Chapter 4 details responses to research questions regarding both the technological and pedagogical challenges for teachers during the COVID-19 pandemic. Multiple levels of coding on sub-questions for each research question resulted in themes and subthemes, which provided more clarity and detail for each research question response. I compared the timeline of the pandemic and participant responses. Teachers were adapting to the use

of technology by year two. Logistical concerns about not connecting to technology were a factor that made it challenging for teachers at the beginning of remote instruction.

For RQ1 regarding technological challenges of online teaching during the pandemic, data showed the onset of the pandemic presented the most difficulties with technology use and implementation. Issues such as “lack of WIFI,” “little technology support,” and “language barriers” for parents (P1), which “limited parents’ ability to assist students with logging in and accessing Zoom and the online course material,” (P6) were reported as “the main technological challenges at the start of rapid remote instruction.” RQ2 regarding pedagogical challenges was addressed by emergent teacher agency and teacher praxis themes. As the data showed, initially, there was a high level of uncertainty and frustration among teachers who had never taught online. During the pandemic, most teachers said they adopted technology and understood it created a time of significant learning loss. Participants expressed a desire to use technology if it provided ways to “differentiate,” “scaffold the learning,” and make it “more engaging for the students.” These findings were consistent with the results of studies in chapter 2 on teaching remotely during the pandemic. Categorizing the findings as technological and pedagogical challenges for teachers allowed me to focus on the problem my study was designed to address, challenges for teachers with little to no prior experience teaching remotely.

Chapter 5 provides detailed information to understand the technological and pedagogical challenges for K-12 teachers in the United States as they taught remotely during the COVID-19 pandemic with varying levels of skill and experience with remote

instruction. In Chapter 5, I discuss interpretations of the findings, limitations of the study, recommendations, implications, and conclusions.

Chapter 5: Summary, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore the perspectives of K-12 teachers in the United States regarding the technological and pedagogical challenges of teaching remotely during the COVID-19 pandemic. At the onset of school closings due to the COVID-19 pandemic, research on the impact of COVID-19 on teaching and learning revealed teachers were unprepared and needed what was referred to as JTPD (Ferdig et al., 2020). Early research showed that many teachers had no experience or training with remote instruction. Conducting a study on teachers allowed me to gather data during the pandemic regarding the timeline of the implementation and the experiences teachers had over 12 months. Four prominent themes emerged: teacher agency, inequities for marginalized students, difficulty building relationships, and teacher praxis.

The first theme*, teacher agency*, emerged as the result of an analysis of the technology limitations placed on teachers by the pandemic impacting teachers' ability to do 'their job'. The second emergent theme, *inequities exposed during COVID-19*, showed how not having internet access and the expense of WIFI presented challenges for marginal students. The third emergent theme, the *challenge of building relationships* with both students and teachers, demonstrated how human interaction is vital to the mental health and continued social growth of human beings. Emergent theme four, *teacher praxis*, showed a gradual adoption of technology and the willingness to see a benefit to using technology in practice.

A significant technology challenge was the inconsistency in connecting with students via Zoom because of technology issues in the students' homes beyond teachers' control. The limitations greatly impacted what teachers were able to succeed in an online, virtual environment and negatively affected teacher agency. WIFI issues, language barriers, and lack of access meant marginal students were less likely to attend virtual classes or fully participate online. The pandemic shed light on the existing limitations for marginal students. The technological challenges and lack of experience of teachers in a remote environment presented roadblocks to building relationships with students and peers. It was not until many months into the pandemic that teachers began to adapt to teaching online. Interactions became more purposeful, provisional, and engaging. Teachers had established new personal benchmarks more aligned with district expectations. This helped teachers adopt new online pedagogy and build upon and improve teacher praxis.

Interpretations of the Findings

My study addressed a gap in the literature regarding technological and pedagogical challenges for teachers immersed in remote instruction during the COVID-19 pandemic. A key finding of this study was the absence of a technology plan which created the disruption to education and resulted in a paradigm shift for teachers requiring increased understanding and targeted use of instructional technology.

Before massive shutdowns due to the pandemic, many classroom teachers had no prior experience teaching online (Imants &Van der Wal,2020). Factors related to teaching remotely during the onset of the pandemic were the lack of education and

training and the teacher's preference for face-to-face instruction (Ma et al., 2018). Lack of desire by some teachers to teach remotely and lack of training have affected the technology adoption rate (Office of Educational Technology, 2017). Teachers were reluctant to adopt the technology. My study extends the literature on technological and pedagogical hurdles teachers face entering a pandemic.

One hurdle for teachers was that they felt unprepared to handle the requirements for meeting the needs of high-need students and students with special accommodations online. Like the findings of Brewer and Cartegena (2020), remote instruction for these students was not successful (Brewer & Cartegena, 2020). The results of my study further confirmed that teachers of high-needs students had challenges with technology and planning that did not allow them to meet requirements for meeting the needs of traditionally marginalized students. In Chapter 2, I combined widely studied theoretical frameworks of K-12 learning and methods of teaching during Covid-19 from teaching to trauma (Carver, 2020; Statti & Jaafar, 2020) to social emotional learning (Borup et al., 2020) to show that teachers quickly determined they would need to meet the students where they were (Bielinski et al., 2020).

My study confirmed other studies which showed teacher uses of learning management systems, open education resources (Chambers & Lipscomb, 2020), a pedagogical adaptation based on a CoI and CoP model (Miller et al., 2020), and the attempts to address the challenges leveraging technology and pedagogy with remote instruction. Studies suggested the success of remote learning and teaching was dependent on many variables: K-12 educators' knowledge from more meaningful training than

JTPD (Hamlen, 2020; Hartshorne et al., 2020; Whalen, 2020) and the use of emergency remote instruction and eventually, the adoption of online pedagogy (Barber et al., 2020; Beck & Beasley, 2021; Hamlen, 2020; Kaufman & Diliberti, 2021). The results of my study confirmed these variables. Furthermore, my study extended the need to move from JTPD to PD, which was interactive and included differentiation and scaffolding for teachers to grasp concepts meaningfully.

Findings from prior research on remote instruction to navigate a pandemic offered recommendations for districts to inform schools, educators, and students to prepare for post-pandemic learning (Kruger et al., 2018). Recommendations were limited to how to prepare for the safety of students when reentering a classroom after the pandemic. Research on prior pandemics (Lister & Stockdale, 2007) did not specify how and where to provide instruction. The study recommended remote education but with no set parameters or prescribed delivery method. At the district level, schools immediately decided to implement virtual instruction. The results of my study confirmed the need to look at remote instruction as a brief alternative to face-to-face instruction during a pandemic.

The teachers I interviewed indicated the students not being able to meet with teachers face-to-face was affecting students' mental health. Some participants did agree no attempt to continue school would have been devastating. Some participants interviewed shared that not all students could log on to the virtual learning platform; however, those who logged on successfully benefited from interactions with peers. Teachers indicated that regular zoom meetings were essential to have some form of

school online. Shared experiences of participants of my study extended studies before COVID-19 regarding online learning and virtual instruction. Prior research by Armstrong (2015), Trust (2017), Kwon (2019), and Mann et al. (2019) supported the use of online learning platforms. Still, the studies strongly advocated human-to-human interactions between students and teachers for meaningful, long-lasting learning experiences.

In this study, an analysis of the data showed four prominent themes: how rapid remote instruction influenced teacher agency, the spotlight the pandemic had on exposing inequities in education, the challenges to building relationships with students and teachers, and the influence the pandemic had on teacher praxis. Themes of 'inequities highlighted by the pandemic' and 'inability of teachers to build relationships with students emerged and extended prior studies by Chambers and Lipscomb (2020) and Krutka et al. (2020) that concluded the pandemic exposed existing disparities in the American education system and early efforts during the pandemic to provide remote instruction did not consider possible bias in online course development or expectations for student use.

The emerging themes extended Ferdig et al. (2020) research that the pandemic impacted schools' ability to reach all students. The results of my study confirmed the research of Basilaia and Kvavadze (2020) by demonstrating the pandemic forced virtual instruction when teachers were not fully prepared, which impacted teacher morale and level of confidence in teaching. My study confirms the research of Beck and Beasley (2021), showing teachers had to build new knowledge of differentiation in the virtual

environment. However, my study showed JTPD could have negatively impacted teacher agency.

Participants in my study responded with dissatisfaction with JTPD. In my research, teachers indicated they were more frustrated with unclear expectations by the district for teachers to immediately demonstrate processes for creating online courses, implement the many features of the online platforms, and in some cases, abandon previously learned technology they had shown students pre-pandemic and switch to synchronous instruction and asynchronous classrooms were given little time and limited training. Teachers felt JTPD was also abrupt. They felt the time to implement what they learned unreasonable, and the constant requests for teachers to demonstrate the use of technology when the time to incorporate it in lessons was not afforded to them was a futile effort.

Theme 1: Teacher Agency

A growing body of literature from 2020 and 2021 indicated teachers felt overwhelmed (Kaufman & Diliberti, 2021) and unprepared to use remote teaching strategies (Plante & Palmer, 2020), struggling to adapt teaching pedagogy to fluctuating situations induced by a pandemic (Smith.2020; Woodside, 2020). My study supported these claims as participants reported they felt helpless, lost, and alone trying to navigate rapid remote instruction during the first six months of the pandemic. My study showed teacher agency was at a low during rapid remote instruction. Still, as the pandemic continued and school closures commenced for the Fall of 2020, teachers were resolved to the fact that remote instruction would be the delivery method for the new school year.

The findings of my study indicated the switch to rapid remote instruction during the COVID-19 pandemic was difficult for teachers as they had to provide instruction remotely given many factors attributed to the pandemic, which were simply beyond their control. The depth of how the pandemic affected teacher agency is evidenced in Imants and Van der Wal's (2020) study. My research extended this as teachers with limited experiences felt underprepared to help students remotely. Several participants said they were uncertain about their professional growth and ability to contribute to the academic development of their students.

Relevant to studies in chapter 2, my study expanded on the prior research by exploring the timeline of a pandemic. My research showed by having had the summer months to make strategic decisions school districts were better prepared for the messaging and the structuring of remote learning. The messaging included a plan for how remote instruction would occur and the expectations for teachers, counselors, parents, and students. The messages to implement the COVID-19 plan for the next school year and revise as appropriate once students re-engaged in classes in the building.

Theme 2: Inequities Exposed by the Pandemic

A COVID-19 study by Kiekel et al. (2020) reported three significant findings: K-12 students relied heavily on teachers, and the sudden shift to rapid remote instruction meant teachers did not have time to prepare themselves students for the change. This lack of preparation was seen as having a lasting effect on a learner academically and emotionally, placing them at risk. My study extended this research by showing the problems pointed out by Keikel et al. were magnified for specific student populations.

Data in my study showed several inequities for two schools whose prominent demographic which were black and Hispanic children. There were challenges with technology, such as being unable to reach ESOL students due to student inaccessibility to immersive tools to enable translation, and students needing accommodations were not attending the Zoom sessions. Participants reported a lack of student attendance and engagement, particularly students with limited English proficiency, students of color, and students with special needs requiring accommodations that were not readily available in a pandemic, severely limited interactions with the teacher due to challenges beyond the teachers' control.

Theme 3: Relationships

Research on teaching during COVID-19 by Carey et al. (2020) showed ways in which a teacher education community leveraged Twitter to form the CoP focusing on remote learning and teaching and how the use of CoP quickly proved to be pivotal in the transition to remote instruction. The results of my study confirmed that using social media platforms to share ideas and experiences proved pivotal for providing the CoP desperately needed. Several participants reported they had joined the teacher group's social media pages, such as Twitter and Facebook, to share experiences, troubleshoot, and share strategies they had learned at professional development offered outside the district. Several teachers said they received recommendations for various uses of online tools and apps that allowed for more engaging synchronous interactions.

The study by Lee (2020) showed that transferring the CoI model, typically used in post-secondary academies, to CoP for K-12 involved making organizational decisions

such as recognizing resource experts among teachers. Lead teachers could run discussion groups around best practices and assist struggling teachers. The findings of my study extended the role of the lead teacher to include nurturing teachers' social and emotional wellbeing. Participants reported they were more readily engaged, knowing their peers would be purposefully sharing resources, volunteering to meet with them in the zoom, and consistently posting helpful tips on social media.

Theme 4: Teacher Praxis

The COVID-19 research of Singer (2020) outlined critical features of CoI which were the need to form relationships first and then move on to content; having measurable learning objectives and meaningful feedback; differentiating instruction to address learning styles, preferences, and needs; and organizing content clearly and concisely, increasing the willingness to adopt technology to nurture teacher praxis and adoption of new pedagogy. My study not only confirmed the benefits of these critical components for successful K-12 teacher development, but it also showed the initial impact of the pandemic significantly reduced teacher ability to practice them. My study confirmed the devastating impact of the pandemic on the entire learning community. The participants in my research indicated that not being able to reach students initially was hard to endure. Not knowing how long they would remain virtual added to hopelessness and despair. However, because of a timeline of more than a full year deploying technology that was available before the pandemic and teaching remotely with online resources to navigate a crisis, my study extended the research of Nelson (2021) and the use of four key factors, or pillars, of digitally infused education.

The findings of my study extended the Nelson (2021) study, which showed the pandemic negatively impacted relationship building and stifled a sense of social presence among teachers and students. My study also extended the prior research by showing teachers demonstrated resilience and the resolve to want to meet the challenges head on. Most participants chose to use the lens of learning loss when considering the outcomes to distance learning during a pandemic. Rather than taking on a deficit view, teachers in my study said transitioning to a new school year when students would have to reenter a classroom would require teachers to shift to intentional practices during remote instruction, including the integration of technology that would enhance the learning experience for students in the classroom. Most participants felt they could have done more for students if they had had an opportunity to provide necessary human interaction face-to-face, which could nurture students' social and emotional well-being and reignited the desire to learn. It was not possible due to COVID-19 restrictions forcing school shutdowns.

My study confirmed and extended the existing research on teaching during the COVID-19 pandemic, and it demonstrated an exploration of a real-world phenomenon using distributed learning and social constructivism. As outlined in chapter 2, distributed learning requires the members of a collective learning experience to have an online social presence, share resources and ideas, and have empathy, with a network to invest in research-based infrastructure, a CoI, and a CoP. These are hallmarks of the Obsidian distributed learning model (Victor & Hart, 2016). My study extended the Nelson study (2017) regarding the importance of digitally infused learning by pointing out that not

having teachers trained for remote instruction and the technological and pedagogical challenges they faced impacted teacher agency and student learning.

Limitations of the Study

By remembering what Patton (2015) said, "not only owning our own perspective but also taking seriously the responsibility to communicate authentically the perspectives of those we encounter during our inquiry" (p. 74), I dedicated to investing my time and energy to being an intuitive researcher. In reflection, the biases I may have had could have influenced the data collection process. Nonetheless, I remained conscious of this, used the interview questions for focus, and included error checking. I journaled and discussed commonalities and themes in data with a colleague who had just completed her dissertation in 2020.

Recommendations

Data from my study may be used to design a plan for instruction to be implemented during a pandemic or natural disaster. The limited scope of the present study was not enough to generalize an understanding of technological and pedagogical challenges for teachers in the United States during the COVID-19 pandemic, nor does it prove transferable to all teachers around the world who were emersed in rapid remote instruction due to a global pandemic. Further research is needed to extend the findings; however, my study can develop future research on what is required for successful student and teacher relationship building in an online platform.

Recommendations for future studies include using larger sample sizes, gathering quantitative data, and interviewing teachers in all 50 U.S. states and teachers worldwide.

More studies are needed to examine the translation of the transition to and from a full year of remote instruction due to a pandemic and the classroom environment during the pandemic era. Future research could explore how the pandemic has impacted the use of virtual teaching and what has been the impact of the COVID-19 pandemic on how school districts educate children with equity in learning in public schools in the United States post-pandemic 2020.

One of the most common themes among participants was teacher agency. All participants initially reported technology challenges as the most oppressive and debilitating experience at the beginning of rapid remote instruction. More than half of my participants said they had used technology in the classroom before the pandemic, but only one teacher was already teaching online. Recommendations for further studies would include comparison studies on teacher level of training and experience and successful adoption of online teaching and learning technology during COVID-19.

With little time to prepare and uncertainty about expectations, participants indicated an abrupt immersion was most challenging in leveraging technology and expectations for student engagement. Additionally, comparison studies could be done on student engagement and success during the COVID-19 pandemic and the transition back to the traditional brick-and-mortar building. As stated in the Nelson study (2017), confirmed by my research findings, the pandemic factored into the loss of engagement by students and the level of confidence teachers had in educating young people. The breakdown in relationship building affected the ability to have an ongoing social presence. Further studies could build upon the existing research by examining what social

presence looked like during the first year back in the classroom and the impact on students.

In addition to teacher agency, the participants expressed concern for students with disabilities, students of color, and students from low socioeconomic areas not having the same experiences being able to log in to Zoom for reasons beyond the teacher's control. Further quantitative and qualitative studies could extend the research on specific disparities for students of color and students needing accommodations exposed by the pandemic to offer recommendations to leaders and schools on how to meet those needs better. The findings pointed to inequities reported by teachers that were also reported in other literature on remote instruction during COVID-19 on students living in socio-economically challenged neighborhoods not having access to broadband or hardware resources to conduct consistent at-home virtual education. Perhaps investigating how various schools handled the disparities could shed light on areas most needing assistance and funding to manage the crisis better.

The participants also expressed the need to have interactions with fellow teachers. The way teachers chose to do so was through social media platforms. Participants indicated this to be a way to share ideas as they felt the JTPD was not meeting the needs of most teachers. Teachers needed to communicate with one another about the technology used and their experiences trying to navigate the pandemic. The sharing of technology resources and other information from a trusted teacher to teachers via social media was supported by further research on teaching during COVID-19 (Baran & Al Zoubi, 2020; Borup et al., 2020; Imants et al., 2020; Lee, 2021; Meritt & Wertzberger,

2020). Further studies could expand upon the use of social media platforms for teachers to see what types of interactions and on which social media platforms teachers rely for professional development and networking.

As for studies of teaching during COVID-19 in the United States, further research is needed in examining the transition from the traditional classroom to rapid remote instruction specific to elementary and middle school. High school teacher experiences, considering Phase I, rapid remote education (Chambers & Lipscomb, 2020), Phase II, the continuation of learning (Clausen et al., 2020), and a full year of remote instruction (Huck & Zhang, 2021). In addition, I recommend follow-up comparison studies in the summer of 2021 and attempts at addressing learning loss.

Implications

My study addressed positive social change by showing themes in teachers' challenges with remote instruction with little experience. My analysis could be used to guide schools in implementing a planning guide addressing the academic quality impact of teacher preparation. In addition, this study could inform teacher preparation providers with evidence regarding teacher needs for ongoing professional development as remote instruction becomes part of mainstream in K-12 schools. My analysis can be added to the research on teaching during a pandemic and challenges to student learning, the desire to learn, and the ability of teachers to reach and teach all students.

My study has furthered the research on pedagogy and best practice and on what can be a solution for schools with students and varying abilities and those not benefitting from a classroom, post-pandemic, and beyond. The results of this study could be used to

assist in moving schools toward revisiting technological considerations for sustaining student and teaching presence in an online environment. School districts, teacher colleges, content designers, and classroom teachers could use the results of my study to consider more convergent and equitable teaching practices for teaching online.

Conclusion

Three months into the COVID-19 pandemic, it had become increasingly apparent from the literature that the pandemic had impacted all learning community members. It was also determined school staff and families had to adopt what Plante and Palmer (2020) referred to as a "we will get through this together attitude." Studies by Chambers and Lipscomb (2020), Krutka et al. (2020), and Woodside (2020) provided information on remote instruction and addressed gaps in the research on remote teaching regarding technology design and that some students would not benefit from remote education. According to this research, the pandemic made it challenging to establish the teacher-student relationship necessary to nurture good learning outcomes. My study further extended this research and the research of Eveleigh et al. (2021), showing teachers of ESOL students and students with disabilities were feeling a continuum of emotions early in the COVID-19 pandemic with the shift to remote instruction given the technology and instructional planning limitations.

Along with showing evidence that teachers were feeling hopeless navigating the challenges of not being able to connect with students, my study showed that teachers felt a certain level of self-defeat trying to help those they did connect with try and troubleshoot the technology challenges themselves. They were unable to be successful

with remote teaching impacting teacher agency. My study also included data on teachers' limited experience teaching remotely, navigating language barriers, the high level of disengagement with the school in general, and the stark reality for students called 'Zoom fatigue.' Teachers in my study reported feeling helpless, overwhelmed, and stressed, opening an opportunity for extending the research on planning for the next pandemic. My analysis may prove to be of support to research on the academic quality impact of COVID-19 (Woodside, 2020).

By including additional data to support the research of Pittman et al. (2021) showing the stark inequities in education and the social-economic divide exposed by COVID-19, the results of this study provided insight into what was witnessed first-hand in the zoom sessions. With cameras on, they had a window into a student's home life. Participants in general reported it was not possible to prepare students using remote instruction for students experiencing a loss of a loved one during the pandemic, low level ESOL students, and students with disabilities. More than 50% of students would simply not participate consistently, with some never checking in. Teachers had little to no success tracking them to ensure they were alright. Participants expressed feelings of hopelessness.

The devastation to school-aged children's learning due to the inability to connect, brought on by COVID-19, greatly affected the teachers' mental health, with several questioning their future in education. Several participants reported on students showing up for zoom, 'going through the motions,' and not entirely investing in what Jansen et al. (2022) referred to as 'social currency.' According to the research findings, I concluded

that diminished social exchange could have been the single most contributor to the adverse effects of remote instruction on student well-being. Six months into mandated remote education, studies showed the following teacher frustrations were reported: a lack of student participation and accountability, as reported by Ferdig et al. (2020), challenges leveraging technology (Koehler & Farmer, 2020) which would engage students, and personal frustrations with teaching from home (Imants & Van der Wal, 2020).

In my study, the most often reported teacher frustrations were also related to lack of student participation, along with many Pre-K to 12-grade students still relying heavily on human interactions with a teacher. The sudden nature of rapid remote instruction meant teachers did not have the opportunity to prepare themselves or their students for the shift to ensure the skills necessary for remote learning. Remote education by December 2020, nine months into school closures, was only three months into a more structured plan for actual online learning and required a different set of skills from teachers and students.

Studies by this time showed a gap in the literature on teachers' challenges not having much experience or training with teaching remotely. The results of the literature from mid to late 2020 showed navigating a pandemic for schools would be dependent on factors such as human-centered design (Baran & AlZoubi, 2020), trauma-informed practices (Statti & Jaafar, 2020), equity in access (García & Weiss, 2020), and leveraging virtually mediated PD (Meritt & Wertzberger, 2020). My study, which began in early 2021, expanded on the research by providing supporting data from K-12 teachers in the

United States on the technological and pedagogical challenges for teachers during COVID-19.

My study will further existing research concerning building online relationships and addressing the inequities with access to technology for low socioeconomic students and students with disabilities requiring special accommodations. The results of my study build upon the research of Imants and Van der Wal (2020) on teacher agency by including a timeline of the pandemic, school closures, and the adoption of technology by teachers. In addition, it expands upon the research of 2021, year two of the pandemic, to include teachers' responses to make conclusions on teacher praxis and supporting teachers where they are.

The most critical finding of recent studies, including my own, was that the COVID pandemic negatively impacted teacher and student engagement and student learning for more than one academic year. The impact this could have on a generation of learners is yet to be determined. The direct negative consequences of an abrupt switch to rapid remote instruction, according to teachers of my study, were the technology and broadband limitations, teachers being unskilled or inexperienced to meet the challenges, and teachers not being able to connect with students in the virtual environment which caused a rupture in the establishment of student-teacher relationships and community necessary to nurture student growth and wellbeing. This negatively influenced teacher efficacy and teacher agency. A silver lining of this switch to remote was that teachers were forced to engage in a new way to design and conduct instruction and facilitate learning.

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Appendix A: RQ1 A priori Codebook

Parent/Child Codes	Title
1	RQ1 - tech challenges during the pandemic
2	RQ1-IQ2 - teaching students remotely
3	any student
3	esol students
3	students with accommodations
2	RQ1- IQ3 - T rapid remote instruction factor
3	student prior tech knowledge
3	teacher prior tech knowledge
2	RQ1- IQ4 - technology use with students
3	hardware and internet access
3	student engagement with technology
2	RQ1- IQ5 - tech use with other teachers
2	RQ1- IQ6 - timeline of tech use and challenges

Appendix B: RQ2 A priori Codebook

Parent/Child Codes	Title
1	RQ2 - pedagogical challenges during the pandemic
2	RQ2- IQ7 - planning and prep challenges
2	RQ2- IQ8 - P rapid remote instruction factor
3	student online learning skills
3	teacher online teaching skills
2	RQ2- IQ9 - interactions with students
3	assessment of learning
3	student engagement
3	engagement with content
3	engagement with teacher
3	student engagement with peers
2	RQ2- IQ10 – prep work with other teachers

Appendix C: RQ1 Double Coding

Codes	MA	SO	MW	MA	SO	MW	MA
RQ1 tech challenges during the pandemic	30	30	42	56	42	54	24
IQ2 teaching students remotely	6	6	18	20	36	12	18
SQ1 any student	6	0	6	9	6	12	0
SQ2 esol students	12	6	6	3	6	30	12
SQ3 students with accommodations	6	6	0	9	6	6	0
IQ3 T rapid remote instruction factor	0	18	18	22	6	30	24
SQ1 student prior tech knowledge	0	0	12	8	6	12	6
SQ2 teacher prior tech knowledge	6	0	6	16	6	6	6
IQ4 technology use with students	12	6	12	30	12	18	12
SQ1 hardware and internet access	6	12	6	11	6	6	6
SQ2 student engagement with technology	12	12	12	26	12	42	12
IQ5 tech use with other teachers	6	6	0	7	0	0	6
IQ6 timeline of tech use and challenges	12	6	30	11	12	12	12

Appendix D: RQ2 Double Coding

RQ2 - pedagogical challenges during the pandemic

Codes	MA	SO	MW	MA	SO	MW	MA
IQ7 planning and prep challenges	30	6	12	24	12	18	6
IQ8 P rapid remote instruction factor	0	0	6	19	0	6	6
SQ1 student online learning skills	6	0	12	9	0	0	6
SQ2 teacher online teaching skills	6	0	6	16	0	0	6
IQ9 interactions with students	36	0	18	21	0	18	12
SQ1 assessment of learning	24	6	6	10	0	12	6
SQ2 student engagement	30	12	18	24	0	30	6
SQ3 engagement with content	24	6	6	12	0	18	6
SQ4 engagement with teacher	24	6	12	11	0	12	6
SQ5 student engagement with peers	6	6	6	10	0	6	0
IQ10 timeline of reaching/teaching students	6	0	12	0	6	6	0

Appendix E: Closures Mainland U.S. Schools

State	State Closure Status	State Closure	Schools Closed	# of Public Schools	Enrollment
Alabama	academic year	3/19/20	4/6/20	1,513	744,930
Arizona	academic year	3/16/20	3/30/20	2,308	1,123,137
Arkansas	academic year	3/17/20	4/6/20	1,089	493,447
Colorado	academic year	3/23/20	4/20/20	1,888	905,019
Delaware	academic year	3/16/20	4/24/20	228	136,264
District of Columbia	academic year	3/16/20	4/17/20	223	85,850
Georgia	academic year	3/18/20	4/1/20	2,300	1,764,346
Illinois	academic year	3/17/20	4/17/20	4,173	2,026,718
Indiana	academic year	3/20/20	4/2/20	1,921	1,049,547
Iowa	academic year	3/16/20	4/17/20	1,328	509,831
Kansas	academic year	3/18/20	3/17/20	1,318	494,347
Louisiana	academic year	3/16/20	4/15/20	1,404	716,293
Maryland	academic year	3/16/20	5/6/20	1,424	886,221
Massachusetts	academic year	3/17/20	4/21/20	1,856	964,514
Michigan	academic year	3/16/20	4/2/20	3,458	1,528,666
Minnesota	academic year	3/18/20	4/23/20	2,513	875,021
Mississippi	academic year	3/20/20	4/14/20	1,066	483,150
Missouri	academic year	3/23/20	4/9/20	2,424	915,040
Nebraska	academic year	3/23/20	4/3/20	1,095	319,194
Nevada	academic year	3/16/20	4/21/20	657	473,744
New Jersey	academic year	3/18/20	5/4/20	2,590	1,410,421
New Mexico	academic year	3/16/20	3/26/20	869	336,263
New York	academic year	3/18/20	5/1/20	4,798	2,729,776
North Carolina	academic year	3/16/20	4/24/20	2,624	1,550,062
Ohio	academic year	3/17/20	4/20/20	3,591	1,710,143
Oklahoma	academic year	3/17/20	3/25/20	1,792	693,903
Oregon	academic year	3/16/20	4/8/20	1,243	606,277
Pennsylvania	academic year	3/16/20	4/9/20	3,004	1,727,497
Puerto Rico	academic year	3/16/20	4/24/20	1,283	365,181
South Carolina	academic year	3/16/20	4/22/20	1,252	771,250
Texas	academic year	3/23/20	4/17/20	8,909	5,360,849
Utah	academic year	3/16/20	4/14/20	1,037	659,801
Virginia	academic year	3/16/20	3/23/20	2,134	1,287,026
Washington	academic year	3/17/20	4/6/20	2,436	1,101,711
West Virginia	academic year	3/16/20	4/21/20	739	273,855
Wisconsin	academic year	3/18/20	4/16/20	2,256	864,432

Note: Adapted *from Data: Coronavirus and School Closures in 2019-2020. December 03, 2021. Updated: January 10, 2022* by Education Week. Retrieved from https://www.edweek.org/data-coronavirus-and-school-closures-in-2019-2020/2021/12.