A Qualitative Examination of Teacher Experience with the Digital Divide

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Abstract

The purpose of this study was to understand teachers' experience with the digital divide in the classroom. The problem addressed by this study is the persistence of the digital divide and a lack of research on how teachers experience the divide. Addressing this gap in the literature is important in order to help teachers improve the digital literacy skills of students impacted by the digital divide. This qualitative, phenomenological study collected data using interviews with teachers purposively sampled from those who teach at a Title 1 high school in a Southwest Florida community. Interview data were transcribed and underwent phenomenological data analysis in order to determine both what teachers experienced, and how teachers experienced the digital divide. Through a constructivist framework, this study described how teachers have experienced and accommodated for the digital divide within the classroom.

Dedication

This dissertation is dedicated to my family, who made countless sacrifices over the past several years to allow me to work on a doctoral degree. To my wife, Theresa, thank you for encouraging me every step of the way; your love and support carried me through times of frustration and difficulty. To my son, Samuel, I promise to make up for the time lost when I had to work instead of play. I hope my completion of this dissertation will someday serve as an example of the value of hard work, perseverance, and grit. To my parents, thank you for being my first teachers; you instilled in me a love for learning and a love for our Lord. Your love, support, and prayer have buoyed me every day of my life.

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I would also like to acknowledge and thank the colleagues and leaders I have worked with professionally. Teachers, you continue to inspire me with your passion for students. Supporting your daily work in the classroom is my greatest role, and I am lucky to have it. To the principals I have worked for, I thank you for teaching me to serve, to do what is best for students, and to support teachers. Your experience and guidance afforded me the opportunity to grow as a leader and affect positive change.

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Chapter 1: Introduction

The evolution of the Internet and information communication technologies (ICT) requires modern learners to acquire new proficiencies and understanding appropriate for a technology-saturated society (Gallardo-Echenique, Minelli de Oliveira, Marqués-Molias, & Esteve-Mon, 2015). Learning computer and digital skills can have an immediate and permanent impact on the life of a learner, as well as the potential to impact society as a whole (Fluck et al., 2016). Despite the importance of such proficiencies, some Americans lack access to the Internet, the skills for beneficial usage, or the readiness to use technology for learning (Horrigan, 2016; Ryan, 2018). Factors further complicating technology access and use in education are software availability, user skill levels, lack of teacher training, and teacher-student cultural misunderstandings (Dolan, 2016).

Disparities related to the Internet and ICT use have been the topic of various research studies. Studies have examined differences across countries, between rural and urban settings, between socio-economic levels, and among other demographic groups (Palvia, Oguz, Huang, Yarmohammadi, & Li, 2017). Research has sought to identify groups at-risk or suffering from deficiencies, as well as how to close gaps and eliminate disparities. As some gaps close and others come to light, research on the topic needs to evolve (Huffman, 2018). Further study on emerging technologies may reveal new disparities related to the Internet and ICT. Additional research on those impacted by disparities could potentially yield effective methods to remedy deficiencies.

Chapter 1 describes the background of the problem and provides a problem statement. A rationale for the research is presented and connected to the problem statement through a description of the research purpose. Research questions narrow the focus of the investigation to

specific and measurable terms. The conceptual framework provides the theory grounding the study followed by the definition of key terms. This introduction further discusses the significance of the study in addition to identifying assumptions, delimitations, and limitations. Lastly, the summary of Chapter 1 reviews the main points of the introduction and previews Chapter 2.

Background of the Problem

The issue of disparities in Internet access was first reported by the National Telecommunications and Information Administration in the 1994 survey *Falling Through the Net* (Cohron, 2015). The term *digital divide* was introduced by then-President Bill Clinton and his administration in the mid-1990s to describe the binary difference between having or not having access to the Internet (Huffman, 2018). In the years and decades since the problem of the digital divide first was established, the topic evolved from one of binary Internet access to include usage, skills, perceptions, and outcomes of use (Robinson et al., 2015).

Palvia et al. (2017) found the majority of research conducted on the digital divide between 2000 and 2016 involved surveys or secondary data analysis. Most of the research sought to either identify adoption and usage of ICT, measure the digital divide, or close the digital divide. The majority of the studies relied on a positivist epistemological approach. Within the examined studies, the use of qualitative methods and constructivist beliefs were less common.

The digital divide is described in terms of levels with the *first* level referencing gaps in infrastructural access, the *second* level referencing gaps in skills and usage, and the *third* level referencing varied outcomes of Internet use (van Deursen & Helsper, 2015). Education level, income, race, age, and ability are predominant factors contributing to the digital divide

(Huffman, 2018). Young people use the Internet more than older people, though the use may be for less beneficial purposes (Serrano-Cinca, Muñoz-Soro, & Brusca, 2018; van Deursen & van Dijk, 2014). In countries all around the world, a digital divide is present according to people's socio-economic status (Cruz-Jesus, Vicente, Bacao, & Oliveira, 2016; Ercikan, Asil, & Grover, 2018). Studies have similarly indicated racial and ethnic minorities are more likely to be impacted by the divide (Ritzhaupt, Liu, Dawson, & Barron, 2013; Tichavakunda & Tierney, 2018). In addition to these factors, a review of research further demonstrated the existence of a digital divide between those in rural and urban areas (Dolan, 2016).

The works of Prensky (2001a, 2001b) introducing the notion of the *digital native* are of additional importance to the problem addressed in this study. Prensky described modern students as digital natives, initiating assumptions by older generations about the digital skill levels of these students (Kirschner & De Bruyckere, 2017). Even students have adopted assumptions about possession of digital skills (Darvin, 2018). Despite the assumption, research indicates students overestimate personal levels of digital skills (Aesaert, Voogt, Kuiper, & van Braak, 2017; Porat, Blau, & Barak, 2018). Wang, Hsu, Campbell, Coster, and Longhurst (2014) further contradicted assumptions about the skill level of digital natives, finding students did not have higher skill levels than teachers. Lisenbee (2016) asserts a fundamental difference between teachers and students still exists in perception of the purpose of technology. Addressing the generational gap is necessary in order to teach students digital skills appropriately.

Statement of the Problem

The problem is a lack of research on teacher experience with the digital divide as manifested and accommodated in the classroom. Research aimed at understanding how teachers perceive and address the digital divide within the classroom is not available despite evidence

suggesting the persistence of the divide. Access to the Internet is not universal, with Black and Latino Americans more likely to suffer from a lack of access (Campos-Castillo, 2015). Sixteen percent of Americans between the ages of 16 and 65 are not digitally literate (Mamedova & Pawlowski, 2018). Less than half of Americans are comfortable and prepared for learning in a digital environment (Horrigan, 2016). Students from low socio-economic backgrounds can suffer from digital exclusion due to assumptions about skill levels and lack of appropriate support (Eynon & Geniets, 2015).

Eliminating the digital divide in schools is critical given the importance of Internet access and digital skills in society. The United Nations declared the Internet a basic human right in 2012 (Bach, Wolfson, and Crowell, 2018; Pick, Sarkar, & Johnson, 2015). Computer skills and knowledge can have an economic, social, and cultural impact for individuals (Fluck et al., 2016). The importance of digital skills has resulted in efforts to close the digital divide, many of which involve public programs or education. The evidence of a continued divide, as well as the critical nature of digital skills and Internet access, establish the problem as current, relevant, and important. More should be known about teachers' experience with the digital divide in the classroom in order to better understand the divide and address the divide in schools. A gap in the literature exists where teachers have largely been left out of research on the digital divide. More research is needed to address this gap. Teachers can play an important role in providing both formal and informal supports to those students lacking digital literacy (Eynon & Geniets, 2015; Lisenbee, 2016).

Purpose of the Study

The purpose of this phenomenological study was to understand teachers' experience with the digital divide in the classroom. This research was needed in order to address the gap in the

literature by examining how teachers experience the digital divide and impact the digital literacy of students. Phenomenology allows for the interpretation and description of a common experience shared by individuals (Creswell & Poth, 2018; Marshall & Rossman, 2016). Through a phenomenological design, this research sought to describe teachers' lived experience with the phenomenon of the digital divide in the classroom. By describing the lived experience of teachers and understanding approaches to digital-literacy deficiencies, the study sought to contribute to the closing of the digital divide.

This study focused on the shared experiences of teachers at a high school in a rural, agrarian community in Southwest Florida. Many of the students at the high school come from low socio-economic backgrounds. More than 90% of students qualify for free or reduced-price lunches. With parents employed as migrant farm workers, some students may be first-generation high school graduates. Students of Hispanic descent make up the majority of the population, and Black students are the second largest racial/ethnic demographic group.

Selection of teachers at the site as the participant population for the study was due to the characteristics of the school and student body. Factors such as education level, income, and race, which Huffman (2018) considered predominant contributors to the digital divide, are all present in the community. The rural setting of the community may further contribute to a digital divide among students at the school. Living in a rural area is a significant factor affecting students' home use of technology (Dolan, 2016). This study sought to describe the experience of teachers at a school with a population likely to be impacted by the digital divide. The description of teacher experience with the digital divide serves as an original contribution to the literature on the topic.

Significance of the Study

The significance of this study could benefit school leaders and policymakers in designing solutions to the digital divide. Understanding teachers' experience in the classroom with the various forms of the digital divide might provide valuable information for improving public support programs. Such public programs are popular, but have failed to adequately impact disparities in digital skills (Helsper & van Deursen, 2017). Understanding teacher experience with the digital divide can further benefit state-level efforts to make computer science and digital literacy skills mandatory curriculum requirements. The results of this study may additionally help determine the need for professional development, which can require significant funding as part of such efforts to increase access to computing education (Adrion, Fall, Ericson, & Guzdial, 2016).

Changes which improve programs and policies aimed at closing the digital divide could have a broad and profound impact. The results of this study yielded suggested strategies to improve teacher practice. Improving the teachers' ability to support digitally excluded youth is essential for closing the digital divide (Eynon & Geniets, 2015). Computer skills can have both an immediate and lasting impact on the life of a learner as well as for society as a whole (Fluck et al., 2016). Bach et al. (2018) draw a parallel from digital literacy skills to traditional literacy skills and the ability for such skills to break the cycle of poverty by increasing social mobility. Narrowing the digital divide could lead to positive social change for students, teachers, leaders, and entire communities.

Research Questions

The following research questions guided the phenomenological study in order to understand teacher experience with the digital divide in the classroom.

Research Question One: How have teachers experienced the digital divide among students at a rural Title 1 high school?

Research Question Two: How do teachers perceive the role of remediating digital literacy deficiencies among students?

Research Question Three: How are teachers addressing digital literacy deficiencies through pedagogy?

Question one was designed to describe the shared experience of teachers with the digital divide in the classroom. Questions two and three were asked to gain a deeper understanding of how teachers respond when experiencing the digital divide in the classroom. Answers to questions two and three supported the provision of a comprehensive description of teacher experience with the digital divide. Questions two and three further allowed the study to describe the understanding of teachers who experienced the essence of the digital divide absent of knowledge on the topic.

Theoretical Framework

The theoretical perspective adopted to guide this study was constructivism. Bada (2015) defined constructivism as the premise of knowledge creation through active construction in the mind of the learner, as opposed to the transmission of information from teacher to student. The constructivist theory of knowledge developed out of the works of several theorists including Dewey, Bruner, and Piaget. Constructivism can explain a situation in which individuals experience the same phenomenon but still have varying perceptions or understandings.

Most digital divide studies are conducted under a positivist paradigm presenting a definitive comprehension of the digital divide (Palvia et al., 2017). Adopting the constructivist theory of knowledge for this phenomenological study allowed the research to consider how

teachers' lived experience with the varying forms of the digital divide might yield uniquely individual understandings. In addition to the connection to teachers' experience, the constructivist theory of knowledge further relates to the digital divide through students' knowledge and skills. Through a constructivist lens, students do not acquire digital literacy skills uniformly. Instead, the skills should develop individually according to individual experience and understanding.

Research questions for this study were developed to explore individual experience and perception. Likewise, the interview protocol and questions (Appendix C) guided participants to share only personal experiences and perceptions. The study fits a constructivist framework through an approach focused on the lived experience of teachers and how experience has shaped individual understanding and practice. Chapter 2 provides further history of the constructivist theory of knowledge and the applicability of constructivism to this study.

Definitions of Terms

Various key concepts and terms used throughout this study can have multiple meanings. Understanding the intended meanings of concepts and terms is essential for comprehending the study and interpreting the findings. The following definitions are intended to provide concise operational definitions to aid in understanding the content and avoid confusion.

Computer Science: a school curriculum teaching approaches to computation and computer applications. The curriculum is separate and distinct from the use of computers to support existing curricula (Fluck et al., 2016).

Digital Divide: social iniquities between individuals, households, businesses, and geographic areas regarding digital technologies. The iniquities may be in the form of access to, ability to

use, frequency and type of use, or usage outcomes of the Internet and other ICT (Cruz-Jesus et al., 2016, Ercikan et al., 2018).

Digital Literacy: the mastery of foundational computer skills including the ability to manipulate computer hardware, knowledge of how the digital environment is structured, and the ability to interact effectively with digital information. Mastery of such skills is necessary for participation in the modern digital environment (Mamedova & Pawlowski, 2018).

Digital Immigrant: one who did not grow up surrounded by the digital world, but later adopted digital technologies. These individuals retain old ways of thinking and learning (Prensky, 2001a).

Digital Native: a modern student who has grown up surrounded by digital technology. These students think and processes information differently than digital immigrants (Prensky, 2001a).

First-Level Divide: the initially identified digital divide consisting specifically of differences among people in access to computers or ICT. Access concerns may include the availability, cost, or quality of computers and ICT (Campos-Castillo, 2015).

Information Communication Technology (ICT): technologies such as computers, the Internet, and mobile devices which allow for individuals to access information and communicate with others. Social media services are newer forms of ICT than more traditional hardware and infrastructure examples (Pick et al., 2015).

Second-Level Divide: the evolution of the digital divide to broader differences than binary access. This level typically refers to differences in digital skills and usage (van Deursen & van Dijk, 2014).

Socio-Economic Status: the social class by which an individual or household is classified based on various measurements of wellbeing such as level of income, level of education, and

employment status. Individuals or households are often considered to be of either low or high socio-economic status (Harris, Straker, & Pollock, 2017; Hsin & Li, 2014; Zilka, 2016)

Third-Level Divide: a further evolution of the digital divide beyond differences in skill level and types of use. This level describes varied ability among people to use digital resources to solve problems (van Deursen & Helsper, 2015).

Title 1 School: a school with economically disadvantaged children which receives additional federal funding. The purpose of Title 1 funds is to help ensure all children gain a high-quality education. (Florida Department of Education, 2019).

Assumptions

This study relied on the assumption participants would be honest and truthful in responses to interview questions. Participating teachers were further assumed to be able to recall and effectively communicate experiences in the classroom pertaining to the research subject. Participants in phenomenological research need to have personal experience with the phenomena (Englander, 2016). For this study, teachers with more years of service at the site were assumed to be more likely to have encountered the digital divide than less experienced teachers. Participants of the study were not expected to be familiar with the definition or background of the digital divide but were assumed, at a minimum, to have experienced students' level of digital access and digital literacy through the exposure provided from every-day classroom tasks and interactions. All core-content classrooms at the site high school are equipped with computers and utilize computer-based assessments.

Scope and Delimitations

The scope of this study was limited to teachers at a high school in a Southwest Florida community. The phenomenological study focused on the lived experience of teachers and

consisted of data collected in interviews. Teachers with greater years of service at the site school were considered more likely to have experienced the digital divide in the classroom. Only teachers with three or more years of service at the school were able to interview to ensure participants had adequate experience to share about the digital divide and digital literacy skills of students. Due to excessive teacher turnover at the school, a higher years-of-service requirement would have severely restricted the sample population. Participation for teachers was voluntary, and identities were protected in order to mitigate any harm to participants (Marshall & Rossman, 2016). The study only sought to cover teacher experiences at a specific site, which may limit the transferability of results to other populations.

Limitations

Phenomenological research typically involves interviews with those who have experienced the phenomenon (Creswell & Poth, 2018). Purposive sampling was required given the need to interview participants with specific experiences, which limits the transferability of the study compared to studies with random samples (Englander, 2016). The setting of this research was particularly unique given the characteristics of the site high school and community. Results may or may not reflect the experience of teachers at other schools. The phenomenological design additionally limited dependability to the proficiency with which participants communicated experiences with the phenomena effectively during data collection. In light of the stated limitations, research practices included use of an audit trail. An audit trail can improve dependability and confirmability by making data and design decisions transparent (Marshall & Rossman, 2016).

Personal views on the digital divide in the classroom exist as a result of previous teaching and administrative experiences at the site high school. The practice of epoche was employed to

avoid personal experience bias from influencing the outcomes of the study. Epoche entails bracketing off personal experience in order to focus data collection and analysis on participant experience (Marshall & Rossman, 2016). Reflexive journaling was used to aid the bracketing process through defining and recording potential personal bias.

Chapter Summary

Chapter 1 introduced the research study; stated the problem and the background of the problem as well as the study purpose; described a theoretical framework; and specified the terms, assumptions, and limitations of the study. Data suggest serious gaps continue to exist in Americans' access and use of ICT (Horrigan, 2016; Ryan, 2018). The digital divide continues to evolve and be the subject of research studies (Robinson et al., 2015). Problematic is a lack of research on teacher experience with the digital divide as manifested and accommodated in the classroom. The purpose of the phenomenological study was to understand teachers' experience with the digital divide in the classroom. Chapter 2 provides a review and synthesis of current scholarly literature on the state of the digital divide, understanding students' digital literacy skills, and efforts to close the digital divide.

Chapter 2: Literature Review

The principal problem in this study is a failure to understand how persisting gaps in students' digital literacy skills are manifested in the classroom. Gaps in digital usage and skills are often referred to as the digital divide (e.g. Campos-Castillo, 2015; Cohron, 2015; Gonzalez, 2016; Huffman, 2018). While the body of literature explores many aspects of the digital divide, little is known about how teachers perceive and remedy digital disparities among students. The purpose of this qualitative study was to understand teachers' experience with the digital divide in the classroom.

Recent literature articulates the endurance of disparities in students' digital access, usage, and skill levels (Campos-Castillo, 2015; Cohron, 2015; Cruz-Jesus et al., 2016; Darvin, 2018; Dolan, 2016; Eynon & Geniets, 2015; Harris et al., 2017; Huffman, 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). Eliminating such disparities remains critical given the importance of digital skills. Lacking computer and digital skills in a society where information technology touches all areas or everyday life may have both an immediate and long-term impact on the life of a student (Fluck et al., 2016). Fluck et al. further suggested the impact of lacking digital skills could reach beyond the individual to affect society as a whole. A variety of solutions have been proposed and implemented in attempts to eliminate the digital divide. These often include government programs or the involvement of public schools (Adrion et al., 2016; Cohron, 2015; Eynon & Geniets, 2015; Lisenbee, 2016; Zilka, 2016), though none have sought to first understand teachers' experience with the digital divide in the classroom.

This review of literature addresses the history of the digital divide and its evolution from a problem of access to a problem of ability, usages, and outcomes. Evidence of the divide's existence and those who are impacted will establish the existing state of the digital divide. This

review further addresses how student's digital literacy skills are understood and measured by educators. Prensky's (2001a) idea of the contemporary student as a "digital native" is challenged through recent studies. Finally, this review examines efforts to solve the problem of the digital divide. Varied approaches and outcomes are presented.

Literature Search Strategy

The search for literature relevant to the study was conducted across various search engines and databases. The EBSCO Discovery Service and the American College of Education's (ACE) library database were the initial and foremost resource relied upon for the majority of research articles. In order to cross-reference databases for literature not available through the ACE library, all searches were replicated in ProQuest, Google Scholar, and the Educational Resources Information Center (ERIC). Results from Google Scholar searches further revealed the Directory of Open Access Journals (DOAJ) and Creative Commons as sources of related literature. Searches were again replicated in both services in pursuit of additional literature. Google Scholar was the primary search engine utilized for discovering literature on methods and theories related to the research study. Print items identified through Google Scholar results were then searched and requested through the Southwest Florida Library Network (SWFLN).

All resources were searched using keywords, phrases, and references to the digital divide. Table 1 presents a list of search terms utilized in the search strategy, which was replicated with each search engine and database. Digital divide, the central term in the search strategy has existed for decades (Huffman, 2018). Searches for studies and surveys were limited to the previous five years due to the rapid pace of technological change and growth. Sources for recurrent surveys and data publication were reviewed throughout the course of the study to

ensure usage of current information.

Table 1

Literature Search Strategy Terms

Attributes of the digital divide	Search terms used in conjunction with the digital divide and its attributes
Digital divide	Education
Computers, mobile devices, smartphones	Learning
Internet, broadband	School
Information Communication Technology (ICT)	classroom
Technology	Teacher
Digital literacy	Student
Access	Curriculum
Usages	Problem
skills	Solution
Outcomes	Digital native
Gaps	Research, study, evidence
Disparities	Impact
	Government
	Measure
	Stages
	Levels

Theoretical Framework

This study leaned toward the constructivist theory of knowledge. Bada (2015) loosely defined constructivism as the viewpoint of knowledge as created through active construction in the mind of the learner. Constructivism as a theory of knowledge is in opposition to the concept of knowledge creation through transmission of information from instructor to learner (Bada, 2015, Yilmaz, 2008). The constructivist theory of knowledge creation as an active and individual process has developed over time from the works of several theorists including Dewey, Bruner, and Piaget (Bada, 2015; Ültanir, 2012)

Piaget (1953) theorized a child's knowledge must be constructed individually through

experience. Other constructivist theories claim knowledge is formed through social interactions with peers (Powell & Kalina, 2009). Ültanir (2012) described how these theories have evolved into the constructivist theory of knowledge, which identifies the creation of knowledge as a process reliant on finding meaning in individual experience and understanding. Applying the constructivist theory of knowledge to the study was important because existing literature and studies present a definitive comprehension of the digital divide. Most digital divide studies are conducted under a positivist paradigm (Palvia et al., 2017). The constructivist theory of knowledge suggests individual teacher experience with the digital divide, which is largely missing in the literature, might present varied understandings. The teachers who participated in this study have constructed distinctive knowledge of the digital divide based on classroom experience at the research site.

The constructivist theory of knowledge applied to this study in a second dimension as well. Using the constructivist theory of knowledge, the theoretical framework for the study recognized students' technological knowledge as a product of personal experiences. Such a belief is counter to Prensky's (2001a) view of an entire generation of students as digital natives who have expert knowledge as a result solely of growing up in the surroundings of technology. Prensky's belief in immersion in modern technology leading to mastery of skills might have resulted in a focus on access to computers among early solutions to the digital divide. The lack of recent literature on the digital divide in the United States and other developed countries further suggests a sense the problem has already been solved. Although gaps in access have narrowed with the increasing prevalence of computers and the Internet (Campos-Castillo, 2015; Cohron, 2015), this review of literature demonstrates the problem of access remains for some and has compounded to disparities in uses, skills, and outcomes. These findings in the literature

support the theoretical framework for the study, which contends technological knowledge is individually constructed through personal experience.

State of the Digital Divide

The term digital divide entered the American lexicon by use from then-President Bill Clinton in the 1990s as usage of computers and the Internet were rapidly intensifying in the United States (Huffman, 2018). The literature uniformly agrees the term originally referred solely to varying access to computers and the Internet (Campos-Castillo, 2015; Ercikan et al., 2018; Gonzales, 2018; Huffman, 2018; Robinson et al., 2015; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). After the turn of the millennia, the term digital divide evolved to describe other concerns, such as disparities in digital skills and types of use, as gaps in access appeared to be closing (Campos-Castillo, 2015; Gonzales, 2018; Harris et al., 2017; Huffman, 2018). Evidence of the shift in the literature is a lack of recent studies in the United States on the original concern of access to technology (Campos-Castillo, 2015). The following section outlines the progression of the literature on the digital divide from gaps in access to concerns about skills, usage, and outcomes.

An Evolving Divide

The original disparity in access to technology is referred to as the first-level divide, with the proceeding disparities labeled as the second-level divide (Campos-Castillo, 2015; Robinson et al., 2015). Despite agreeing on the original meaning and first level of the digital divide, the literature is fragmented on the evolution. Research by Cohron (2015) acknowledged the closing of the access gap and described broadband connectivity and digital literacy as the new focus of research on the digital divide. These factors were cited as the next evolution of a constantly changing digital divide but do not stray far from the issue of access. Broadband connectivity is a

type of access, as is mobile phone use, which was similarly recognized as impacting Internet access. A lack of digital literacy, loosely defined by Cohron (2015) as a level of comfort and familiarity with Internet use, was explained as a reason why some choose not to access the Internet.

Harris et al. (2017) contrast Cohron (2015) in describing the remaining divide in access as a matter of geographic location. Government policies and programs specifically targeted the elimination of the access divide in rural areas of Australia (Erdiaw-Kwasie & Alam, 2016). Harris et al. (2017) conducted a study in Australia to examine the relationship between socioeconomic status (SES) and the use of information technology. This study was conducted through secondary data analysis of survey responses by children with nearly universal access to computers. The findings indicated students from high SES areas used computers at school more frequently, for longer time periods, and for more academic activities than students from low SES areas. Students from low SES areas used computers more at home, though the uses were not for learning purposes. The study concluded a digital divide was still present, not in access, but in how students were using information technology. Similar results were found in a study of the Dutch population, in which van Deursen and van Dijk (2014) claim the digital divide has shifted from a binary question of access to the various ways in which the Internet is being utilized. Huffman (2018) further affirms the need to shift the focus on the digital divide from access to usage of computers and the Internet.

Within the literature specific to the second level of the digital divide are differences in the definition of gaps in usage of digital technology. In some instances, usage gaps were presented as a difference in skill or ability, defining students by who can or cannot use technology (Dolan, 2016). Huffman (2018) exemplifies this approach having stated “the new digital divide is no

longer about the ‘haves’ and ‘have nots’ but about ‘who can use it’ and ‘who cannot’” (p. 243). Other researchers approached usage as a matter of choice instead of ability. Harris et al. (2017), as well as van Deursen and van Dijk (2014), examined usage in a single country in terms of time spent on different types of activities, with activity categories classified by appropriateness or value to the user. Büchi, Just, and Latzer (2016) further examined usage differences among five different countries with high rates of Internet access and similarly found a new divide in usage.

The literature further identifies the existence of a third level of the digital divide. Gaps classified as being a part of the third level are those involving varied influences and outcomes which Internet use brings to people’s offline lives (Darvin, 2018; Haight, Quan-Haase, & Corbett, 2014; van Deursen & Helsper, 2015). Darvin (2018) explored the third level of the digital divide to determine the influence of Internet use on social status. Through a case study contrasting Internet use between two children of different social classes, Darvin demonstrated how varied uses of the Internet could affect one’s social position. This study viewed the Internet as the cause and social status as the effect in the third level of the digital divide.

Van Deursen and Helsper (2015) further researched the third-level divide. In this study, survey data were collected from a sample of Internet users who had similar usage patterns and unencumbered access. The study sought to identify outcomes of Internet use and how these outcomes differ among people. Findings indicated gaps among users in different areas including education, social, economic, institutional, and political outcomes. The study demonstrated the Internet has more beneficial outcomes for those in higher social classes. This study presents social class as the cause and Internet outcomes as the effect in the third level of the digital divide. Despite viewing the cause and effect relationship differently than Darvin (2018), van Deursen and Helsper’s (2015) findings are not contradictory. The relationship between social status and

Internet use appears to have mutual effects. Results from both studies illustrate the existence of the third level of the digital divide.

Use of the terms first level, second level, and third level to describe the digital divide may imply a progression over time. Much of the literature describes the shift from the first to second-level divide as a result of technological advancements reducing access barriers (see Gonzalez, 2016; Harris et al., 2017). Conversely, the shift to the third level was due to changes in research focus as opposed to an evolution of the disparities among users. Darvin (2018), for example, sought to discover how social class impacted the digital literacy of youth. The third-level divide is portrayed as coinciding with, not replacing, the first and second level.

Further illustrating the danger of associating a temporal order with the stages of the digital divide is a trend in the literature of a renewed focus on the original issue of access. In arguing for a change in focus from first level issues, Huffman (2018) admits the fight for equitable access is not over. Robinson et al. (2015) point out disparities from the first-level divide are still present, even in the United States. Campos-Castillo (2015) specifically re-investigated the question of access in the United States through a study using survey responses from a large and nationally representative sample. Racial and ethnic gaps were found to have lessened but remained statistically significant. The results further indicated men have less Internet access than women. This study confirmed varying levels of access still exist among different demographic groups.

Within the literature are presentations of additional definitions for levels of the digital divide. The conceptual framework for a study by Ritzhaupt et al. (2013) adopts a unique three-level set of digital divides specific to technology in schools. The first level is equitable access to technology within schools. The second level refers to frequency and types of use for technology

within the classroom. The third level of digital divide according to this framework is the student use of technology for personal empowerment. The framework is specific to schools but contains a similar progression, from access to use and outcomes, as the broader sample of literature on the digital divide. A study by Helsper and van Deursen (2017) uniquely presents access to Internet support as a further level to which the digital divide has progressed. As research on the digital divide continues, the possibility exists further gaps might be identified and labeled as levels beyond the established three.

Evidence of Continued Divides

Research of different forms has been conducted for decades on the subject of the digital divide. Despite the progression of the body of literature to the third-level divide, research continues to illustrate various disparities in first and second-level divides (see Cohron, 2015; Dolan, 2016; Gonzalez, 2018; van Deursen & van Dijk, 2015). The variety of disparities illustrates the complex nature of the digital divide. Gaps once thought to be eliminated are being reinvestigated.

Access gaps persist. In the United States, few research studies focused on the narrowing access divide since the field turned to questions of usage (Campos-Castillo, 2015). Such a gap in the literature, according to Campos-Castillo, implies access was taken for granted in the United States. The assumption access is overlooked in other developed countries may be true given the existence of similar gaps. Renewed concern has provided updated evidence of sustained gaps in access to technology in the United States. In a study on the question of continued disparities in Internet access, Campos-Castillo (2015) found racial, ethnic, and gender access divides were still present in the United States. The concept of access is now more complicated than having or not having technology given the need for technology maintenance. Gonzalez (2016) discovered

some survey respondents who answer the question of access affirmatively actually go without access regularly due to ongoing cost and technical maintenance issues. The first-level divide similarly persists in other well-developed countries, where gaps in access remain (Haight et al., 2014; Park, 2017; Philip, Cottrill, Farrington, Williams, & Ashmore, 2017).

Research studies on Internet use. Inequalities associated with the second-level divide have been a more frequently explored subject of recent literature on the digital divide. A study on the spatial clustering of information communication technology (ICT) utilization in the United States found social status, ethnicity, and level of education to be significant factors (Pick et al., 2015). This study is limited in the use of the state level for analysis but is one of few studies done in the United States on the subject of ICT utilization. Büchi et al. (2016) compared the second-level divide in Internet use between the United States, United Kingdom, and New Zealand. Results found age to be the most significant factor in Internet usage frequency. Without placing value on different types of use, the study found education level and employment status predict usage of the Internet for commercial transactions but not social interactions.

The findings of Büchi et al. (2016) are corroborated by a study of countries in the European Union conducted by Cruz-Jesus et al. (2016). This study focused solely on education level as a factor impacting the digital divide. Results demonstrated similar gaps in general ICT adoption and Internet use among countries depending on the level of education. The most significant gap was found between those with high and average levels of education. Despite similar findings regarding the impact of education level on the digital divide, discussion of the results warned of overlooking domestic divides for more-popular aggregate comparisons of entire countries such as the study conducted by Büchi et al. (2016).

Some studies have taken a deeper look at Internet use within a country. In a study of

Dutch Internet users, van Deursen and van Dijk (2014) found those with lower levels of education and the unemployed spent more time on the Internet than those with jobs and higher levels of education. This usage was more likely to be classified as gaming and social interactions. Despite spending less spare time on the Internet, those people with higher levels of education and income were found to use the Internet in more beneficial ways. Another study by van Deursen and van Dijk (2015) found education level to be a significant factor in Internet skill levels as well. Studies of the Dutch population suggested gaps in Internet use mirror, and even prolong, offline social inequalities.

A study by Serrano-Cinca et al. (2018) on the second-level divide in Internet use in Spain found similar gaps to those in the Dutch population. Income level, education level, age, and employment were found to be factors impacting varied uses of the Internet in Spain. Similar to the findings by van Deursen and van Dijk (2014) within the Netherlands, gaps in usage in Spain are not a result of lack of access or amount of usage. Serrano-Cinca et al. (2018) demonstrated income level impacted e-commerce and e-government usage but had no impact on social media use. These findings demonstrate clear divides in Internet use among those without education, employment, or training.

Survey data. Survey data on Internet usage in the United States are available from various sources. The Census Bureau reports data on computer and Internet use in the United States through the American Community Survey (ACS). This data revealed 89% of households in 2016 owned a computer or smartphone (Ryan, 2018). The usage data pertain to the types of devices within the household, unlike the study by van Deursen and van Dijk (2014) which examined different purposes or types of Internet use. Ryan (2018) found 11% of households do not own a computer or smartphone, though access may be available outside the home. The data

revealed additional gaps in usage by device types. Smartphones were found to be more common in younger households, and some households are becoming reliant on smartphones alone. The survey data do not refer directly to the digital divide but do illustrate differences in use among peoples and places in the United States.

Through another survey, the Pew Research Center examined a specific aspect of the usage divide by analyzing people's preparedness and comfort using digital tools for learning (Horrigan, 2016). Implications from the data are markedly different from results shared by Ryan (2018) from the ACS, which primarily focused on the type of device being utilized. Horrigan demonstrated American adults are spread across a spectrum of readiness for digital learning, with less than half prepared and comfortable using computers and the Internet for learning. Respondents in the unprepared group admitted a lack of both digital skills and trust of online information, which contributed to hesitation to use digital tools for learning. At the other end of the spectrum are 17% of Americans whom Horrigan refers to as digitally ready. This group is confident in the use of technology and actively involved in personal learning such as online courses or online research. The study was limited in its narrow focus on the use of technology for learning, but the results reinforce the existence of usage disparities among Americans. Horrigan found lower income and lower education households in the United States are more likely to be unprepared for digital learning. Such findings are parallel to research on usage in other countries suggesting low SES demographic groups have less beneficial usage of the Internet. Both the research studies and survey data illustrate the continued existence of first and second-level divides in the United States and abroad.

Populations Impacted by the Digital Divide

Identifying those impacted by the digital divide has been a core tenet of research on the

subject. Beginning with early research concerning access, and continuing with research on second and third-level divides, researchers have described various demographic subgroups suffering from the digital divide. Consistent identification of age, race, and SES as digital divide factors led Bach et al. (2018) to recognize a connection to broader social exclusion and the issue of poverty. Van Deursen and van Dijk (2014) likewise found a connection between the digital divide in Internet usage with social, economic, and cultural inequalities in society. These similarities may be explained by the discovery of a direct relationship between traditional literacy and Internet skills and usage (van Deursen & van Dijk, 2016).

Age. Age has consistently been cited as a determining factor of digital divides (Bach et al., 2018; Huffman, 2018). Van Deursen and van Dijk (2014) found age was the greatest factor determining Internet usage. This study considers divides among students of a homogenous age group, though recognizing the impact of age is still relevant given the age difference between students and teachers. Younger age groups have higher amounts of Internet usage compared to older groups, but use by young people may be for less beneficial purposes (Serrano-Cinca et al., 2018; van Deursen & van Dijk, 2014). Furthermore, younger households have greater usage of mobile devices than older households (Ryan, 2018). These studies illustrate key differences in technology practices among age groups which might impact an individual's interpretation of the digital divide.

Geographic location. The location of a household is identified in the literature as a factor impacting both access and use of the Internet. Geographic location was one of the initial factors shown to impact the original access divide (Cohron, 2015). In terms of access, location was considered a structural factor because communities relied on requisite infrastructure for high-speed Internet access (Bach et al., 2018). Cohron (2015) describes government programs

and improvements in technology as being responsible for largely closing the structural divide in access in the United States. As the reach of the Internet grew, and research on divides progressed to the second level, the geographic location of users became less of a focus (Dolan, 2016).

Digital divides between rural and urban locations remains a popular subject of research (Palvia et al., 2017). Research indicates a geographic divide still exists in the United States with those in urban areas more likely to have computer and Internet access (Dolan, 2016; Lustria, Smith, & Hinnant, 2011; Ryan, 2018; Wang, 2013). The data reveal the Northeast and South are the two regions with the least amount of use according to computer ownership and Internet subscriptions. Chen (2013) likewise found a clear and persistent divide between urban and rural areas in the United States, with rural Americans accessing and using the Internet less than those in urban and suburban areas. Similar urban-rural and geographic divides have similarly been found to exist in other countries (Erdiaw-Kwasie & Alam, 2016; Haight et al., 2014; Philip et al., 2017). The significance of the divide between rural and urban locations is contested in the literature despite being a popular research topic (Palvia et al., 2017).

Contrasting findings of a clear geographic divide are studies implying location is a less significant factor. A study on Internet use and the digital divide in Spain (Serrano-Cinca et al., 2018) supports the diminished existence of a geographic divide. The results revealed less usage in rural areas than in urban areas as hypothesized, though the difference was mainly in older population groups. Van Deursen and van Dijk (2014) found those in urban areas use the Internet for longer time periods than those in rural areas, but the difference was mostly in the amount of use for social interaction. In addition, the geographic divide was not significant for other uses with more beneficial outcomes. Another study by Park (2017) investigated remoteness as an

indicator of digital inequalities in Australia. The results revealed remoteness was a predictor of lower Internet connectivity, though other SES factors were determined to have a compounding effect on connectivity. The study did not demonstrate a uniform correlation between population density and connectivity. Within urban areas, higher population density was associated with lower connectivity.

Level of income and education. The literature consistently points to SES components of income and education to describe those impacted by digital divides. Around the world, countries at various stages of development experience the SES digital divide (Cruz-Jesus et al., 2016; Ercikan et al., 2018). Those in the highest income category in Canada were found to be five times more likely to have access to the Internet than those in the lowest income category (Haight et al., 2014). SES elements are frequently cited within the literature as antecedents to the various digital divides as well (Palvia et al., 2017). In Spain, only age is a more impactful variable on Internet use than income and education level (Serrano-Cinca et al., 2018). As a result, Serrano-Cinca et al. labeled those with low income, who are uneducated, or unemployed as digitally excluded. Even in places where access is nearly universal, those in low income or unemployed subgroups are less likely to make beneficial use of the Internet (Harris et al., 2017; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014).

The same SES divides seen around the world continue to be present in the United States as well. A qualitative study by Gonzalez (2016) revealed low-income Americans may continue to struggle with physical access to the Internet. This group suffers from the first-level divide due to costs associated with maintaining and replacing technology. Census data reported by Ryan (2018) revealed more specific details about income and education gaps in access. Households of the highest income category (combined income of $150,000 or more) had 99% computer

ownership and 96% had a broadband Internet subscription. In the lowest income category (combined income of less than $25,000), only 72% of households own a computer and 58% have a broadband subscription. Gaps between those from the highest to lowest education levels were similarly large.

Gaps associated with SES further extend to uses and outcomes of the Internet. Horrigan (2016) found in the United States adults from lower-income households or with lower levels of education were more likely to be labeled as unprepared to utilize the Internet for digital learning. Those with higher income and education levels were more likely to be labeled as digitally ready. Dolan (2016) conducted a research review and found SES to be a common element in research on various levels of the digital divide. The review highlights findings demonstrating varied types of usage among students of differing SES. Additional studies have further demonstrated the SES gaps in the United States (Büchi et al., 2016; Reisdorf & Groselj, 2017; Ritzhaupt et al., 2013)

Ethnicity and race. Another category identified in the literature as impacted by digital divides is ethnic or racial minorities. A meta-analysis of digital divide papers conducted by Palvia et al. (2017) found demographic characteristics to be the most frequently identified antecedent, though race made up only a small subset of the category. The literature largely agrees race is a factor impacting the digital divide (Dolan, 2016; Ercikan et al., 2018; Huffman, 2018; Robinson et al., 2015). Studies have further revealed similar results regarding which racial and ethnic minority groups are most likely to be at a disadvantage.

Campos-Castillo (2015) specifically sought to examine the Internet access of the Black and Hispanic populations in the United States compared to those identified as White. The results indicated both of these demographic groups are less likely to report having access than those

who are White. Becker, Lockwood, Lee, Saunders, and Josephson (2015) likewise found those who were Black and those who selected other for race/ethnicity were less likely to be frequent Internet users than those who were White. Survey data from Ryan (2018) corroborated this access divide by demonstrating Black households were least likely in the United States to own a computer or tablet and have an Internet subscription. Furthermore, households having access only via smartphone were most likely to be Black or Hispanic. The race/ethnicity gaps are not isolated to the first-level divide, as Black and Hispanic Americans are similarly less likely to be digitally prepared for learning than those who are White (Horrigan, 2016).

Tichavakunda and Tierney (2018) conducted a review of literature on the digital divide to determine how Black students are represented, how Black culture is considered, and what can be learned about Black students. The review found evidence Black students spend more time on the Internet than White peers and are more likely to own a smartphone. Tang and Patrick (2018) examined race/ethnicity as one factor in the use of technology and social media among teenagers. The results revealed Black students used technology and media more often than those of any other race/ethnicity, except for Asian students use of computers for school. These findings are contrary to other evidence establishing a divide in access between Black and White racial groups (Becker et al, 2015; Campos-Castillo, 2015; Horrigan, 2016; Ryan, 2018). In terms of the second-level divide, Tichavakunda and Tierney (2018) found Black teenagers have lower ICT skills than White teenagers. Lower skill levels despite greater usage was attributed to usage of smartphones as opposed to personal computers, and primary use of the Internet for the purpose of social networking.

Few research studies have solely considered race/ethnicity apart from other factors such as income, education, and employment. Research has indicated students from racial minorities

in higher education institutions can still lack necessary digital skills (Buzzetto-Hollywood, Wang, Elobeid, & Elobaid, 2018). These findings suggest race may be a factor independent of education level or other SES elements. Ritzhaupt et al. (2013) examined the digital literacy skills of middle school students in relation to ethnicity and other factors. For this study, ethnicity was categorized as either White or non-white. The results indicated White middle school students in Florida were significantly better at completing ICT tasks than non-white students. Nationally representative data from the Census Bureau does not confirm all racial minorities are suffering from the digital divide. Asian households in the United States, a much smaller demographic group than White, Black, and Hispanic households, are the most likely to own and use computer devices and have an Internet subscription (Dolan, 2016; Ryan, 2018). In addition, Asian students spend more time using computers for school than students of any other race (Tang & Patrick, 2018). The sum of the literature presents a nuanced understanding of a digital divide by race/ethnicity. Gaps are evident in areas but are not inherent or universal.

Understanding Students' Digital Literacy Skills

Digital literacy is a broad term with definitions varying by the source. Most definitions include functional elements relating to the use of computers and navigation of the Internet, as well as communication elements relating to the interpretation and creation of information using ICT (Buckingham, 2015; Chetty et al., 2018). Digital literacy skills could include creating digital documents, accessing information and resources from websites, or use of social networking sites (van Laar, van Deursen, van Dijk, & de Haan, 2017). Research on digital divides resounds with agreement on the importance of such digital literacy competencies.

The Importance of Digital Literacy Skills

Developing digital literacy skills inherently requires access to computer devices and the

Internet. The importance of the Internet in modern society is pronounced to the point the United Nations declared access to the Internet to be a basic human right in 2012 (Bach et al., 2018; Pick et al., 2015). Governments have recognized the importance of the Internet and developed programs to bring access to areas not yet connected (Harris et al., 2017; Gonzalez, 2016; Philip et al., 2017). In the United States, these government efforts initially included technology funding for schools and libraries (Cohron, 2015). Government funding has shifted as the important focus of the digital divide evolved (Cohron, 2015; Gonzalez, 2016; Smith, 2016).

Fluck et al. (2016) conveyed the importance of digital literacy by explaining the economic, social, and cultural rationales for teaching computer science. The economic rationale included the increase of computer and information services as a worldwide trade sector, the need for computing professionals in all sectors and shortage thereof, and the importance of software and intellectual property in trade. The rationale from Fluck et al. took a macro-economic approach to the importance of digital literacy skills, but an economic rationale has been applied to the individual level as well (see Bach et al., 2018). The economic rationale is the most widely adopted reasoning for the importance of digital literacy skills, with many studies on the digital divide mentioning economic importance in some form (Palvia et al., 2017). The identification of low-income households as likely to suffer from the digital divide has further contributed to the use of the economic rationale by researchers advocating for digital divide solutions (Bach et al., 2018; Robinson et al., 2015).

The social rationale Fluck et al. (2016) provided for teaching computer science is the importance of computers in daily life and how computer technologies are changing the way people live. Society values creators and producers of technology. Individuals comfortable with computer science are able to choose a role in society. Bach et al. (2018) similarly stressed the

potential social impact of computer skills and compared digital literacy to the role of education in the social mobility of people in poverty. According to the study, attainment of digital literacy skills creates an opportunity for upward movement in social classes. Like education, the impact of digital literacy and computer skills on social movement can be compounding for those in poverty. Helsper and van Deursen (2017) found those with less digital resources are less likely to access formal sources of support upon encountering a problem.

The rationales presented by Fluck et al. (2016) described the importance of computing skills from two perspectives. The first perspective involves the scale of the population which might benefit. Attainment of computer science skills is said to impact the life of an individual in various ways including economic betterment and social connectedness. The rationale further claims the same individual skills could lead to greater societal improvement, benefiting more than a single individual, through technological advancements or cultural change. Huffman (2018) similarly described the potential for both individual and societal change resulting from closing the digital divide. The second perspective in the Fluck et al. (2016) rationales is the time period of the potential benefit. Computing skills are presented as having immediate and be short-term benefits as well as benefits lasting a lifetime. The rationales further present the possibility of perpetual societal benefits. Bach et al. (2018) recognized the ability for computer skills to have lasting benefits. Digital literacy skills were presented as a means to break the cycle of poverty, thereby having the potential to affect generational change.

The argument by Fluck et al. (2016) is for the inclusion of computer science classes in the K-12 curriculum given the importance of the skills. Much of the literature on the digital divide is aimed at students and younger segments of the population where divides first materialize. Ercikan et al. (2018) explained the importance of students' technological

competence given the increasingly digital environment of learning and assessments. Almost all state and national level assessments are claimed to have digital components. An important component of digital assessments are ICT skills, which have implications not only for the results but additionally for how the results are interpreted. While the importance for students to acquire digital literacy skills is well documented, the Fluck et al. (2016) economic, social, and cultural rationales apply to the importance of digital literacy skills for all ages. Bach et al. (2018) highlighted an ethnographic research project with adults and demonstrated the importance of teaching digital literacy extends beyond students and younger generations.

Assumptions About Student Skill Levels

The term digital native was coined by Prensky (2001a), who described the difference between the thinking of 21st-century students compared to previous generations. Prensky referred to modern students as digital natives because the students have been born into and surrounded by a digital society. As a result, 21st-century students were said to be fluent in a new digital language. The viewpoint asserts digital natives have skills which have been "acquired and perfected through years of interaction and practice" (Prensky, 2001a, p. 2). Older generations, often including the educators teaching digital natives, were presented as *digital immigrants* who are forced to adapt and learn the new language and digital society. The coinage of the term digital native by Prensky was the origin of an assumption about the digital skill levels of students (Kirschner & De Bruyckere, 2017).

Prensky (2001a) was followed by others in the field of education who claimed modern students already possessed digital skills and had learned these skills independently. Kirschner and De Bruyckere (2017) pointed out these claims were based not on research, but rather on rationalizations for behaviors. The example of young people helping adults with technology

problems is given as an example of behavior supporting the rationalization. Other research data elude to a correlation between age and digital skill level. Age is a determining factor of digital divides (Bach et al., 2018; Huffman, 2018; van Deursen & van Dijk, 2014), though higher amounts of Internet usage by younger age groups may not lead to beneficial outcomes (Serrano-Cinca et al., 2018; van Deursen & van Dijk, 2014). Tang and Patrick (2018) reported adolescent students spend one to five hours per week on the computer for school, three to nine hours playing video games, three to nine hours texting, and another three to nine hours per week on social networking sites. Lisenbee (2016) agrees with Prensky (2001a) on the existence of fundamental differences in perception of technology between digitally-native students and classroom teachers. According to Lisenbee, students view technology as a tool to communicate, interact, and create, while teachers view technology as a tool for research and presentations.

Students may have adopted the same assumption as teachers about the differences in skills between the two groups. Students have been found to over-estimate ICT skills when given self-efficacy questions compared to actual ICT competencies (Aesaert et al., 2017; Porat et al., 2018). These results suggest students are overly-confident regarding ICT skill level. Darvin (2018) conducted a qualitative case study examining the impact of social class on the digital literacy of two youth. Despite research affirming the digital divides between social classes, both the youth from a higher class and the youth from a lower class held high confidence in personal skill level. Both described having to help teachers with technology in the classroom. Darvin elaborated to explain both participants upheld the notion of the digital native by perceiving the skill level of youth as equal and natural. In another study, some youth reported recognizing the teacher's assumption students were already experts with the Internet (Eynon & Geniets, 2015).

The body of literature suggests the notion of the digital native has become widely adopted by both older and younger generations.

Countering the assumption of the digital native. Prensky's (2001b) argument for evolving educational strategies to reach a new generation of students is largely uncontested. The concept of the digital native has been more controversial. Research revealing continuing digital divides runs counter to assumptions of students as inherent digital experts. Especially damaging to the notion of the digital native is the literature establishing varied divides correlated with race-ethnicity and SES demographic groups who do have access to the Internet (Cruz-Jesus et al., 2016; Harris et al., 2017; Horrigan, 2016; Serrano-Cinca et al., 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). Such findings challenge Prensky's (2001a) claim of students perfecting digital skills through only interaction and practice.

Eynon and Geniets (2015) conducted a study highlighting the problematic nature of assuming young people learn technology skills independently. This qualitative study was composed of in-depth interviews with 20 young people who personally identified as having low Internet use and skills. Each of the participants in the study was of middle or low SES. Participants' low SES status made the sample more likely to be impacted by digital divides (Darvin, 2018; Gonzalez, 2016; Harris et al., 2017; Horrigan, 2016; Ryan, 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). In addition, Eynon and Geniets (2015) reported the group struggled with finding information online, sending emails, and participating in social networking sites. According to van Deursen and van Dijk (2014), these are common usage types for low-income students. Digitally excluded youth were further found to be lacking high-quality access, support networks for developing skills, and motivation to gain skills (Dolan, 2016; Eynon & Geniets, 2015). Eynon and Geniets (2015) found learning of digital literacy skills to be

determined by the individual context of the learner. Celebrating independent learning in this area and assuming student proficiency is problematic. Likewise, Darvin (2018) recognized the challenges to the assumption of digital natives and contributed with findings from a case study revealing the impact of social class on digital literacy skill levels.

A study by Wang et al. (2014) specifically investigating the assumption of modern students as digital natives was conducted by comparing the technology experiences of science teachers and students. The study utilized mixed methods, including surveys, classroom observations, and teacher focus groups, in order to thoroughly examine differences between the use of technology by students and by teachers, both inside and outside the classroom. The study found both teachers and students utilize the same technology the most at home: cell phone, laptop computer, and desktop computer. Results further revealed students used mostly word processing and search engines in school while using technology mostly for communication and entertainment outside of school. Taking into consideration the findings of van Deursen and Helsper (2015) indicating those with lower levels of education use the Internet for less beneficial purposes, the results are unsurprising. Wang et al. (2014) focused on the difference between students and teachers through a diverse sample allowing for generalized results. Differences in student technology use by demographic subgroup were not considered.

Wang et al. (2014) found teachers' use of technology was more frequent and more productive than students' use both inside and outside of school. Teachers use of technology in the classroom was focused on productivity software due to a feeling students did not know how to use other technology. Findings provide evidence opposing the notion generations of digital natives have perfected technology skills and have surpassed older generations defined as digital immigrants. Another study of junior-high students by Porat et al. (2018) further attacks the

validity of the digital native. This quantitative study measuring students' actual and perceived digital literacy skills found almost no correlation between the two. The students had severely overestimated personal skill levels.

Kirschner and De Bruyckere (2017) claim to have debunked the myth of the digital native with evidence of age as a non-factor in determining Internet skill level. Throughout the literature questioning its validity is a call to correct the assumptions associated with digital natives. Many of the works conclude digital skills cannot be sufficiently learned independently and should be taught (Buckingham, 2015; Eynon & Geniets, 2015; Kirschner & De Bruyckere, 2017; Lisenbee, 2016). Even students entering higher education may have been impacted by the digital divide and have deficient digital literacy skills (Buzzetto-Hollywood et al., 2018).

Measuring Digital Literacy

Gallardo-Echenique et al. (2015) conducted a review of literature on the concept of digital literacy and related terms. The review found the concept unstable and without clear guidelines for evaluation. Chetty et al. (2018) similarly found the lack of a universally accepted definition in a study including a review of literature on digital literacy. Lack of a common definition was blamed for inhibiting broad and comparable measurements. According to the study, measuring digital literacy is further made difficult by the fluid nature of technology and of skills considered to be a core competency. Furthermore, the study established the importance of measuring digital literacy in order to assess methods undertaken to close the digital divide.

Darvin (2018) suggests the skills and competencies encompassing digital literacy may vary depending on local social context, making any singular definition inappropriate. Chetty et al. (2018) found digital literacy typically refers to core competencies or basic skills needed to access and utilize digital information. Cognitive skills were stressed as an important part of the

definition in addition to technical skills. Likewise, Buckingham (2015) pointed out the objectionable tendency for digital literacy to refer only to functional skills. Chetty et al. (2018) refer to functional-only skills as computer or ICT literacy.

Porat et al. (2018) measured the digital literacy competencies of seventh-grade students in order to compare actual digital literacy with self-assessments. The assessment of digital literacy was conducted online through the completion of six tasks aligned to the authors' definition of digital literacy. The six components were photo-visual literacy, reproduction literacy, information literacy, branching literacy, social-emotional literacy, and real-time thinking literacy. Both the cognitive and functional skills described by Chetty et al. (2018) are evident within the tasks completed for the study. Results from Porat et al. (2018) indicate skill level between the different components of digital literacy can vary and are unrelated on an individual level. The results highlight the difficulty of measuring digital literacy as a single concept. A limitation of the study was the use of an online-only measurement of digital literacy, which can lack inclusivity by disregarding of those without access or ability to take the assessment (Chetty et al., 2018).

The Program for the International Assessment of Adult Competencies (PIAAC) defines the digitaly literate as those with foundational computer skills, awareness of how the digital environment is structured, and the ability to interact effectively with digital information (Mamedova & Pawlowski, 2018). Results from a PIAAC survey revealed approximately 84% of United States adults were digitally literate (Reder, 2015). Mamedova and Pawlowski (2018) analyzed survey results to understand who makes up the group of digitally illiterate adults in the United States and how the United States compares to other countries. Results found digitally illiterate adults were more likely to be Black, Hispanic, migrants, and of lower SES. These

results align with previous research on digital divides in access (Becker et al., 2015, Campos-Castillo, 2015; Gonzalez, 2016; Haight et al., 2014) usages (Harris et al., 2017; Horrigan, 2016; Ryan, 2018; Tichavakunda & Tierney; 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014), and outcomes (Darvin, 2018; Dolan, 2016; Van Deursen & Helsper, 2015). Results from Mamedova and Pawlowski (2018) indicated the rate of 16% digitally illiterate U.S. adults is lower than the international rate of 23%, though the rate in the United States is similar to the rate in other developed countries.

Closing the Digital Divide

Efforts to close the digital divide are nearly as old as the divide itself (Cohron, 2015). Bach et al. (2018) even drew a connection between divides associated with digital literacy and those of traditional literacy. The study suggested applying similar strategies as solutions to inequities in other forms of media and literacy. Most solutions involve either government programs or the public education system. Examples of both are discussed in this section.

The Role of Governments

Governments have played an essential role in efforts to address the digital divide. This role commenced with the Federal government in the United States producing the first high-profile report highlighting a disparity in access (Cohron, 2015). More recently, a presidential initiative was aimed at reducing gaps in availability of computer science classes (Smith, 2016). Cohron (2015) details government initiatives providing funding for computer and Internet access, which were initiated soon after the disparities came to light and continued in various forms with the changing dynamics of the digital divide. Harris et al. (2017) provide a further example of Australian and British governmental policies, inspired by research on the importance of computers, which have increased access to computers and the Internet. Factors such as SES

continue to demonstrate digital disparities.

Research renewing focus on the initial access divide has called for additional government funding and programs to close these gaps. Gonzalez (2016) calls for the subsidization of repairs and trade-ins in addition to supporting initial means of access. Likewise, additional public terminals to increase the amount of access was proposed. Government funding has helped close the access divide in the past, although the demographics and reasons for non-use have shifted, calling into question the continued effectiveness of similar efforts (Helsper & Reisdorf, 2017).

The Role of Education

A role of governments at many levels is providing public education. Through formal education, and public-school systems, is an avenue often cited for suggested methods to close digital divides (see Adrion et al., 2016; Eynon & Geniets, 2015; Fluck et al., 2016; Lisenbee, 2016; Zilka, 2016). Fluck et al. argue for the inclusion of computer science in school curricula due to the ability for related skills to increase knowledge generation in many areas, in addition to economic, cultural, and social benefits. The authors acknowledge computer science skills could be integrated with other curricular areas, as often occurs with reading and math. Though such efforts are said to have been ineffective and require highly trained teachers.

Guzdial (2016) highlights an initiative by President Barack Obama to make computer science classes available to all students but acknowledges the federal government is not responsible for determining school curricula. This power is handed down state and local governments. Computer science is said to be an elective course in much of the United States. Adrion et al. (2016) stated few students take these courses, and the ones who do are often white or Asian males. Guzdial cites funding and the development of teachers as two of the primary barriers to overcome for increasing the reach of computer courses. Guzdial further cautions such

efforts take years, even when conditions such as funding are met.

Eynon and Geniets (2015) studied digitally excluded youth, concluding negative experiences were shaped by access, support networks, and motivations. In addition to the obvious impact of poor access, lacking support networks and motivation are presented as barriers which might be overcome through the educational system. The study called for schools to be part of a positive support network by providing both access and positive experiences. Cross-curricular connections and extracurricular activities are suggested examples. These indirect solutions are what Fluck et al. (2016) argued against in calling for computer science as a separate and required subject.

Though a less direct approach than computer science courses, Eynon and Geniets' (2015) study claimed increasing access and support in schools is more effective than expecting digitally excluded youth to rely on informal support from peers. The study revealed relying on peer support could hamper digital skill development in youth. Helsper and van Deursen (2017) agree formal support networks are more effective at helping Internet users overcome problems than informal supports. The study examined the effectiveness of support networks in rectifying digital exclusion. Results indicated informal networks of support (e.g., family and friends) to be less effective than formal programs despite being a more natural solution.

Helsper and van Deursen (2017) examined the availability and effectiveness of supports for digital engagement. The study found formal programs such as those offered in schools are popular and more effective than informal networks of support. Despite popularity and effectiveness, the study claims these programs have not been satisfactorily successful in closing the digital divide. The failure of programs to close the digital divide is further evidenced by the persistence of gaps in access (Campos-Castillo, 2015; Gonzalez, 2016; Haight et al., 2014; Park,

2017; Philip et al., 2017).

In addition to examining the effectiveness of support networks, Helsper and van Deursen (2017) further studied who accessed various supports. The results indicated those of higher SES and those with greater Internet skills have more access to the better formal systems of support. People experiencing the most problems online have access to support, but the support is often less effective informal support systems. These findings strengthen the argument of Fluck et al. (2016) to require computer science courses for all students. By remaining optional, formal programs are more likely to be accessed by those less in need of skill improvement (Helsper & van Deursen, 2017).

Teacher Integration of Technology

Teacher integration of technology into classrooms has been thoroughly examined as a subject of research. Research has supported the integration of technology to further students' academic performance (Williams, 2017). Appropriate integration of technology into the classroom by teachers, to teach technology use to students, can further help narrow the digital gaps between students and teachers (Lisenbee, 2016). In addition to the value of technology use in classrooms, a review of the literature on the topic demonstrates the difficulty of integration.

The integration of technology into the classroom is largely dependent on individual teachers (Gibson et al., 2014). This dependence has led to a great deal of research on the perception of classroom teachers towards technology and its integration into the classroom (see for example Admiraal et al., 2017; Carver, 2016; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). Some teachers are critical of the use of technology in the classroom, some are uncomfortable given low confidence in personal abilities, and others favor teaching with technology (Admiraal et al., 2017). Frequently cited barriers to the classroom integration of

technology include the availability of technology, both student and teacher skill level, teacher training, and the availability of support for teachers (Carver, 2016; Delgado, Wardlow, O'Malley, & McKnight, 2017; Hsu, 2016)

Models Designed to Close the Divide

Many in the literature have stressed the importance of teaching digital literacy skills as a means to close the digital divide or correct the assumption of the digital native, but have not proposed how such teaching should be accomplished (e.g. Buckingham, 2015; Eynon & Geniets, 2015; Kirschner & De Bruyckere, 2017). Others have posited specific models as solutions. Chetty et al. (2018) advocate for the creation of a certification process for digital literacy skills to serve as a link between education and employment. Certifications could encourage training programs to develop the flexibility to accommodate the fluidity of digital skills needed for occupations. Certifications could further serve as a method for individuals and institutions to measure personal skill development.

Another solution presented through the context of education at the local level is the provision of individual computer devices to students of a school. Research on *one-to-one* programs in schools has been positive (Zheng, Warschauer, Lin, & Chang, 2016). Mucetti (2017) boldly stated, after instituting a one-to-one initiative, a school district became "an example of how the tool of technology can transform the educational lives of students and genuinely eliminate the digital divide that plagues so many school systems" (p. 34). Zilka (2016) likewise found providing home access to computers can help narrow the digital divide. This study found low SES students realized gains in access, mobility and computer literacy when provided either a desktop or hybrid computer for home use. A further review by Hsin, Li, and Tsai (2014) of 87 articles found technology to have positive effects on child development.

Contrasting these findings are research on Internet use which have revealed continued digital divides based on beneficial usage types and outcomes regardless of access (Harris et al., 2017; Serrano-Cinca et al., 2018; van Deursen & van Dijk, 2014).

The EMSCI model. Lisenbee (2016) presented a five-level process for teachers to use in the classroom to encourage independent use of technology and make up for the gap between students' and teachers' perception of the need to use technology. The levels of the model include: (a) exploration of technology without instruction, (b) the teacher modeling use of technology with purposeful mistakes, (c) scaffolded instruction in small groups under the supervision of the teacher, (d) classroom problem solving through discussion in a whole-group setting, and (e) independent technological activities for practice of skills and strategies. The model employs a gradual release strategy to pass responsibility for technology on to students. Allowing students to use technology independently according to the EMSCI model can equalize the gap in technology perception between teachers and students. The gradual release strategy in the model further echoes the sentiment asserting students need to be carefully taught digital literacy skills instead of assuming the skills are learned independently (Buckingham, 2015; Eynon & Geniets, 2015; Kirschner & De Bruyckere, 2017).

The New Digital Divide Support Structure (NDDSS) model. Huffman (2018) proposed the NDDSS model to address the new digital divide. The new divide is described as a difference in who can use ICT, not who has access. To address the new divide, the model focuses on training individuals for appropriate uses of technology through education institutions. The first step in the NDDSS model process is forming partnerships between education institutions and other entities, both public and private, to train and educate the population. The second step is to hire professionals to provide training and support. The final step in the process

involves determining the training needs based on the specific population. The NDDSS model assumes a single digital literacy with uses which are either appropriate or inappropriate. Darvin (2018) presents an alternative viewpoint, suggesting multiple digital literacies based on local social context.

Model to broaden computing education access at the state level. Adrion et al. (2016) claims advocating for computer education at the state level is important despite large initiatives from the White House (see Smith, 2016). Guzdial and Morrison (2016) further explained the need for computer science. The comparison is made between science and math, where students begin learning background information at the earliest stages of education. Few secondary and post-secondary computer science students have any prior formal education in the subject, and the gap between the students who have and do not have a background in computing education is large (Guzdial & Morrison, 2016).

Adrion et al. (2016) described a model by which to further computer education at the state level. The first step in the model is to identify a state leader who can connect and participate in existing initiatives and programs. The second step is to determine the state-specific process for educational policy change. Adding computer science to the curriculum for every student might necessitate changes in areas such as high school graduation requirements or teacher certifications. Organizing a cross-sector committee to influence and advocate in the various levels and departments at the state level is the third step in the process. The final step in the model is to find initial funding for likely expenses in making the change happen. This model is applicable for the efforts Fluck et al. (2016) advocated in order to make computer science courses required for every student. Contrasting solutions in education, such as the less formal improvements to access and support proposed by Eynon and Geniets (2015), would require a

different approach.

Methods in the Literature

The literature relating to the digital divide contains an array of studies which have varied in purpose and methodology. Nearly all research conducted to define and describe the digital divide has been quantitative in nature. One of the quantitative methods utilized was the secondary analysis of data from population enumerations (e.g., Cruz-Jesus et al., 2016; Pick et al., 2015; Ryan, 2018). Use of national and international census data allowed researchers to access large and nationally representative samples. Other research on elements of the digital divide utilized assessments to collect data (e.g., Aesaert et al., 2017; Ercikan et al., 2018; Porat et al., 2018; Ritzhaupt et al., 2013;). Using an assessment to measure ICT skill level provided better external validity than relying on self-reported skill levels (Porat et al., 2018). The greatest majority of quantitative studies cited in this literature review relied on survey data. The purpose of some of the studies, and the applied surveys, were directly related to the digital divide (e.g., Haight et al., 2014; Harris et al., 2017; Serrano-Cinca et a., 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). Quantitative data enabled researchers to identify the extent of the digital divide as well as those demographics impacted.

Qualitative methods have been employed to examine the digital divide. Case studies using interviews for data collection were the most common qualitative method found in the literature (e.g. Darvin, 2018; Eynon & Geniets, 2015). Darvin (2018) used a case study to examine how social class impacts the digital literacies of youth. Other studies have taken the reverse approach, using qualitative methods to investigate how the digital divide impacts people (e.g., Eynon & Geniets, 2015; Gonzalez, 2016). An ethnographic study was similarly highlighted by Bach et al. (2018) to demonstrate the connection between the digital divide and

broader social exclusion. Wang et al. (2014) was the only study in the reviewed literature employing a mixed methods approach. This study included teacher focus groups and classroom observations in addition to a quantitative survey to investigate the validity of the assumption of digital natives. The study was the only found in the literature collecting qualitative data from teachers regarding the digital divide.

Gap in the Literature

The digital divide is a well-researched and addressed topic in the literature, though the landscape of the divide is in a state of constant change (Cohron, 2015). The literature describes the evolution of the divide to now include disparities in technology access, skill level and uses of technology, as well as the varied outcomes which technology such as the Internet can provide to individuals. Wang et al. (2014) was the only study found in the literature to collect qualitative data on the subject of the digital divide from teachers. This study examined the difference in technology use between teachers and students, but did not investigate how teachers perceive and remedy disparities among students. Much research, both qualitative and quantitative, has been conducted on teacher integration of technology, but none on teacher's perception of the digital divide in the classroom. How the divide is manifested in the classroom, and how teachers address digital literacy gaps is absent from the literature. Given the many representations and impacts of the divide, research on this subject can be a valuable contribution to the existing literature.

Chapter Summary

Chapter 2 provided a review of literature on the subject of the digital divide. The literature includes the evolution of the divide from a problem of access to a problem of ability, usages, and outcomes. The evidence of present divides and those likely to be affected was

provided. The review discussed the importance of digital literacy skills and how skills are measured, as well as challenges to the notion of students as digital natives. Efforts to solve the digital divide were then examined. The prominent methods found in the literature were reviewed and a gap in the literature was established. The following Chapter 3 discusses the methodology of this study, which sought to narrow the gap in the literature.

Chapter 3: Methodology

The purpose of this phenomenological study was to understand teachers' experience with the digital divide in the classroom. The literature describes multiple forms of the digital divide and manifestations of the divide in impacted populations (Bach et al., 2018; Campos-Castillo, 2015; Cohron, 2015; Eynon & Geniets, 2015; Harris et al., 2017; Helsper & van Deursen, 2017; Huffman, 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). Proposed solutions to the problem of the digital divide include education in the public-school setting (Bach et al., 2018; Lisenbee, 2016). Despite an abundance of research on teacher use and perception of technology, teacher perception of the digital divide among students is lacking. Understanding how teachers experience variations in students' digital access, ability, and types of use is needed to develop solutions to the digital divide.

Research Questions

The phenomenological study employed a qualitative research approach to understand teacher experience with the phenomenon of the digital divide in the classroom at the research site. The applied research sought to answer the following research questions:

Research Question One: How have teachers experienced the digital divide among students at a rural Title 1 high school?

Research Question Two: How do teachers perceive the role of remediating digital literacy deficiencies among students?

Research Question Three: How are teachers addressing digital literacy deficiencies through pedagogy?

Chapter 3 discusses the phenomenological design and rationale used for the study. Existing relationships are disclosed and roles for conducting the study are described. Specific

processes and procedures used for sampling and selection of participants, data collection, and data analysis are identified and discussed. Data collection instruments, communication with participants, and the informed consent process are detailed. The chapter concludes by describing how the study sought to ensure ethical treatment of participants, data validity, and data reliability.

Research Design and Rationale

Qualitative research methods are a broad approach used in exploration of a subject. Defining characteristics of qualitative research include a real-world approach to data collection, analysis of individual or group experience, and inclusion of participant voice in order to understand how one constructs meaning from experience (Flick, 2018). Prominent qualitative designs include case study, ethnography, grounded theory, and phenomenology. Despite variations in different research designs, Creswell and Poth (2018) describe all qualitative methods as involving both description and interpretation in order to report on the multiple realities of the research subject. Creswell and Poth further designate qualitative methods as an appropriate research design when the researcher is exploring a problem or issue.

Phenomenology

Phenomenology as a qualitative design is used specifically in research of individuals' lived experience. Phenomenological research is conducted to analyze, interpret, and describe the meaning or essence of a common experience shared by individuals (Creswell & Poth, 2018; Marshall & Rossman, 2016). Accordingly, this study sought to understand the experience of teachers at a Title 1 high school with the digital divide in the classroom. Phenomenological research may be further classified as using interpretive or descriptive analysis. Englander (2016) defined descriptive phenomenology as seeking to identify the basic framework of a phenomenon.

Interpretive phenomenological analysis (IPA) utilizes hermeneutics to interpret the meaning of the participant's experience (Noon, 2018). This study primarily took a descriptive phenomenology approach in alignment with the stated purpose. The research was not purely descriptive, as experts agree interpretation is an unavoidable element of qualitative research (Creswell & Poth, 2018; Marshall & Rossman, 2016).

Design Appropriateness

Phenomenology is the most appropriate design for research questions seeking to understand the common experience of a phenomenon by individuals (Creswell & Poth, 2018). Use of descriptive phenomenology to identify the essence of the phenomena, as described by Englander (2016), was appropriate given the absence of existing literature on teacher experience with digital divides in the classroom. A benefit of this design was the ability to collect thorough data from a small number of participants. Phenomenological research can be conducted with as few as three individuals (Englander, 2016; Padilla-Díaz, 2015). With the small number of participants required, the researcher was able to target a specific site from which participants were sampled to carry out the study. Use of semi-structured interviews for data collection is common within phenomenology and provided the researcher thorough data to answer each of the three research questions on teacher experience with the phenomena.

Role of the Researcher

Using a phenomenological approach, a researcher seeks "to explore, describe, and analyze the meaning of individual lived experience" (Marshall & Rossman, 2016, p. 17). The researcher for this study acted as an observer only in collecting and analyzing data from participants. The researcher was previously a teacher and administrator at the research site and had his own experience with the digital divide. An understanding of what the phenomena is

about aided the researcher in finding participants, which can be difficult in phenomenological research (Englander, 2016). In addition, preconceptions and personal experience of the researcher were potential threats to the validity of the phenomenological research. Through the practice of epoche, where the researcher bracketed off his own experience and preconceptions, the data collection and analysis process focused solely on participant experience (Marshall & Rossman, 2016).

Experience with the research topic can provide the researcher an ethical foundation for his relationship with participants (Flick, 2018). The need to protect participants and the community at-large were especially important to the researcher given existing ties to the community. The researcher was a teacher at the site from 2011 through mid 2016, resulting in a collegial relationship with other teachers. For the following two years until mid-2018, the researcher was an assistant principal at the site. The assistant principal role resulted in a supervisory relationship with teachers including professional development and evaluation responsibilities. The researcher has not lived within the community where the site school is located, but as a teacher and administrator was involved in many community initiatives and events. The researcher's role at the time of the study was assistant principal at another school in a different community within the same school district.

Despite the potential benefit of the researcher's experience and familiarity with the research site, existing relationships with participants is a primary ethical concern in qualitative research (Marshall & Rossman, 2016). Participants included former colleagues and teachers once supervised by the researcher. None of the participants were under the current supervision of the researcher. To reduce concerns about the researcher's prior status as an evaluator, participants were reminded of confidentiality and protection procedures. The researcher did not

inform other teachers or administrators of participant identities at any time. Potentially identifying information recorded during interviews was removed or concealed by pseudonyms during the transcription process. The final research report anonymized the identity of the participants, school, school district, and community in order to protect the participant's and the at-risk population which participants serve. Participants were reminded the purpose of the study was to understand teacher experience with the digital divide in the classroom. The opportunity to withdraw from the study at any time or for any reason was reiterated during informed consent and again during the member checking process.

According to Flick (2018), accuracy of data and interpretation is a basic principle of ethically sound research. Management of variables which might undermine the reliability and validity is important. The purpose of this study was to understand teachers' experience with the digital divide in the classroom. Teacher experience outside of the classroom, at another site, or with children who are not students had potential to negatively impact the reliability and validity of the study. To control the variable of teacher experience, participants were reminded during interviews to only share experiences specific to classroom teaching at the research site. References to experience at a different school, with one's own children, or any experience outside of the context of teaching at the research site were removed during data organization and were not included in data analysis. Member checking was offered to ensure responses to interview questions accurately portrayed participant experience. Furthermore, the researcher kept a reflexive journal throughout the data collection and analysis procedures in order to identify his own experiences and practice epoche. Creswell and Poth (2018) explained this practice does not entirely remove the researcher from the study or allow him to forget personal experience. Instead, epoche allows the researcher to set aside personal views in order to focus on

participant experience. The transparency brought to the research through the practice of epoche helped the researcher avoid influence from the variable of researcher bias.

Research Procedures

Research procedures begins with a description of the population targeted by the study. Criteria by which the population was purposively sampled are stated. The instrumentation used in data collection is then discussed followed by a detailed description of all data collection procedures. Documents described in this section are presented in the appendices in full text.

Population and Sample Selection

Difficulty selecting participants can be the greatest issue for a phenomenological researcher since participants need to have personal experience with the phenomena (Englander, 2016). The target population for the study consisted of classroom teachers at a high school located in a rural community in Southwest Florida. Teachers at this site were purposively sampled due to the demographics of the community and student body, which made the teachers likely to have experienced the phenomena of the digital divide. Common factors determining who suffers from the digital divide are race and socio-economic status, with those of a racial minority, ethnic minority, and low-income households most likely to be impacted (Bach et al., 2018; Harris et al., 2017; Huffman, 2018; van Deursen & Helsper, 2015). The target population work at a high school classified by the United States Department of Education as eligible to receive Title 1 funding due to a high percentage of children coming from low income families. The site school has above 90% of students qualifying for free or reduced-price lunches every year. The racial and ethnic demographics of the school mirror the demographics of the community. Nearly three quarters of the student population are of a Hispanic ethnicity. Students identified as Black, which consists of varied ethnicities including African American and Haitian

American, are the second largest subgroup. The demographic characteristics of the school result in the likeliness the teachers have experienced the digital divide. By purposively sampling from only these teachers, the researcher was likely to find participants who share common experience.

Approximately 100 instructional staff members work at the high school selected for the sample. As expected at a high school, teaching assignments include core academic classes in Language Arts, Math, Science, and Social Studies. Elective and other curricular areas include Career and Technical Education (CTE), Physical Education (PE), Fine Arts, and World Languages. Recruitment focused on participants who teach core academic classes. CTE teachers were excluded if computer science or digital literacy elements were present in the course curriculum. Certain CTE teachers may have different experience with the digital divide due to inherent student interest and interaction with digital technologies in some CTE classes.

To fulfil the purpose of phenomenological research, participants need to have experienced the phenomenon (Englander, 2016). This study only included teachers with three or more years of service at the school. The inclusion of teachers who have been at the school for at least three years and exclusion of certain CTE teachers helped ensure participants have common experience with the digital divide in the classroom. Given high teacher turnover, the number of teachers at the school who matched participation criteria was 45. Englander (2016) and Padilla-Díaz (2015) agree three individuals is the minimum for conducting phenomenological research. Creswell and Poth (2018) cite varied minimums and maximums, but state "the important point is to describe the meaning of the phenomena for a small number of individuals who have experienced it" (p. 161). Englander (2016) notes larger numbers of participants in a phenomenological study result in greater reliability through improved understanding, but not

greater generality of the results. At least five participants were sought to take part in the study and up to fifteen would have been accepted.

Researchers conducting phenomenological studies need to carefully choose participants in order to fulfill the purpose of the research (Creswell & Poth, 2018). For this reason, this study utilized personal recruitment of participants who were known to match the sample criteria. Participants were contacted by email using the recruitment email in Appendix B. The email contained an introduction to the study and the informed consent form (Appendix A) as an attachment. Participants were asked to carefully review, complete, and return the informed consent form if interested in participating in the study. Informed consent signatures were obtained via email or in person at the time of the interview. Only those participants who returned the informed consent form or who replied expressing interest were contacted for interviews. Response to the recruitment email rendered additional recruitment unnecessary. The informed consent form in Appendix A was reviewed with participants in person immediately prior to conducting interviews to answer any additional questions from participants.

Instrumentation

Semi-structured interviews were used to collect data in this study. Utilizing a topical approach, the interviews were separately scheduled with each participant and followed guiding questions. The topical approach allows a researcher to explore specific topics while permitting the participant to freely construct responses based on personal perspective (Marshall & Rossman, 2016). The interview protocol containing the broad questions which guided the interview can be found in Appendix C. This protocol was developed for the study to align specifically with the study's purpose and research questions. Existing literature on the digital divide was used to develop questions specific to the phenomena, yet broad enough to allow for valid responses free

of researcher bias. A draft interview protocol was shared with a panel of researchers experienced in using interviews to collect data for qualitative research. Feedback provided using the rubric in Appendix D was incorporated to improve reliability and validity.

Following the suggestion of Englander (2016), the interview protocol for the study structured the first questions to explicitly ask the participant to describe experience with the phenomena. The original interview protocol accomplished this strategy using a single question, which asked participants to describe experience with the digital divide in all forms. Following the review by experienced researchers, this question was modified into three separate questions each asking about experience with a specific form of the digital divide. The revision improved credibility by removing the need for the participant to recall a multi-part question. The fourth guiding question allowed the participant to provide a summation of experience and a comprehensive personal definition of the phenomena. The fifth question was about teacher action and response to experience with the phenomena of the digital divide. This question was omitted if participants described actions and responses in the course of answering the first four questions. Prompting participant reflection in this area helped ensure data were provided to answer research questions two and three. Follow up questions were asked for clarification and to ensure context was provided for the described experiences. Gathering the context of the participant experience was essential for the structural description, which was needed along with the textual description to form the essential meaning of the phenomena (Creswell & Poth, 2018).

Data Collection

Recruitment and data collection began with the delivery of the introductory email and informed consent form (Appendix B and Appendix A). Interviews were scheduled once informed consent was obtained through the signed form and all participant questions had been

satisfied. Interviews were scheduled for one-hour blocks to allow enough time for participants to thoroughly recount experience with the phenomena. The setting for the interview was a private and quiet location away from the school site and outside of normal work hours. The interviews were conducted in a face-to-face format when possible to allow for greater nuance and depth to the data (Englander, 2016). Audio recordings of the interview were made using a digital voice recorder. Handwritten notes were taken during interviews to compare with transcripts during data analysis procedures. Scheduling of interviews prioritized participants' privacy and anonymity, minimizing interruptive impact, and conduciveness of audio recording.

Audio recordings of the interviews were stored on an encrypted external hard drive. The hard drive, computer used for data analysis, and reflexive journal with field notes were stored securely in a locked location. Only those conducting and overseeing the study have access to secure materials. All audio recordings and subsequent transcriptions were kept offline to avoid risk of unauthorized access through data breaches of third-party software platforms. In accordance with the American College of Education Institutional Review Board (IRB) standards, data will continue to be stored in this secure fashion for three years before being permanently destroyed through erasure.

Interview recordings were transcribed into a text document by playing back audio files multiple times at reduced speed to ensure accuracy. For the initial data reduction process, filler words like *you know, um*, and *uh* were removed from transcripts. Within one week of the interview, the transcript was emailed as a password protected text document to the participant for review. Participants had the opportunity to confirm the accuracy of the transcript, make revisions, or add to the transcript to better describe experience with the phenomena. Seven of the ten participants completed this process, known as member checking, which builds the

dependability and credibility of the study (Marshall & Rossman, 2016). Participant involvement in the study did not span more than two weeks and was complete upon conclusion of the member checking process. A copy of the dissertation research report will be available to participants upon request.

Data Analysis

The data analysis process included both the preparation of data and following established procedures for analyzing phenomenological data. Software utilized in the process is cited and explained. Researcher preparation necessary to limit bias is then discussed. Finally, a detailed description of steps undertaken to analyze data is presented.

Preparation

Raw audio data from the interviews had already been transcribed and undergone initial reduction prior to completion of member checking. Both raw audio data and transcripts were used in analysis. All data for the study was loaded into the 2018 version of the MAXQDA software program. MAXQDA is a widely utilized and comprehensive qualitative data analysis program capable of assisting the researcher in collecting, organizing, analyzing, and visualizing data (MAXQDA, 2018). For this study, the researcher used MAXQDA only to organize, manually code, and visualize data. Computer generated coding and analysis features were not applied.

Prior to engaging with the data, reflexive journaling was used to describe personal experience with the phenomena in order to bracket aside any biased understanding and focus on the experience of participants. Creswell and Poth (2018) believe completely removing influence from the researcher's experience is difficult, and recommend practicing epoche prior to proceeding with participant experience. Keeping a fresh perspective for participant interviews

requires a researcher to be conscious of his own understanding and beliefs. Practicing epoche and bracketing personal experience were especially important in the study given previously described ties between the researcher and study elements.

Analysis Procedures

The initial examination of the data consisted of both listening to audio and reading transcripts of interviews multiple times. Entries in the reflexive journal were made during this examination to record general impressions or issues. This initial immersion in the data provided a sense of the whole interview and allowed analysis to stay true to the data during subsequent examination (Hycner, 1985). Further data analysis followed the process for phenomenological research described by Creswell and Poth (2018):

1. Review of data for significant statements,
2. Grouping of significant statements into themes,
3. Development of a textural description of what participants experienced,
4. Development of a structural description of how the phenomena was experienced, and
5. Construction of a composite description of the essence of the phenomena.

The identification and demarcation of significant statements occurred within MAXQDA. The software acted only as a tool for organizing and visualizing data. Marshall and Rossman (2016) asserted the necessity of researchers in the qualitative analysis process to embrace and become familiar with the data, and the inability of any mechanism to replace the mind of those who are conducting the research. The context obtained from initial review of the data and existing literature on the digital divide were used to identify significant statements.

Interview data was coded using primary and secondary coding cycles. The common practice of using pre-determined theoretical codes was avoided during this stage of analysis

(Flick, 2018; Marshall & Rossman, 2016). Instead, in vivo coding was used as the method to assign primary codes. In vivo coding utilizes the participant's own words or phrases as codes, and is especially appropriate for studies focusing on participant voice (Miles, Huberman, & Saldaña, 2014). The use of in vivo coding is aligned with the process of highlighting significant statements in Creswell and Poth's (2018) description of the phenomenological data analysis process. Additionally, in vivo coding aligned with the constructivist framework for the study. After primary coding of all interview data was complete, the secondary coding cycle consisted of pattern coding. Pattern coding was used to assemble the primary-coded significant statements into broader themes (Miles et al., 2014).

A data visualization was created to map connections between themes and assist data analysis. Integrating significant statements to expand on themes, a textural description of what participants experienced was then written. The setting of the experience was written into a structural description using the same narrative process. These descriptions included direct quotes from significant statements, but likewise needed to consider elements being unintentionally filtered or evidence of which the participant was unaware (Padilla-Díaz, 2015). Despite taking a descriptive approach to phenomenological analysis, these steps inherently involved some interpretation, as does all qualitative research (Marshall & Rossman, 2016). Using the textural and structural descriptions the essence of the phenomenon was composed with a focus on the common experiences of the participants.

Reliability and Validity

The purpose of phenomenological research is to analyze, interpret, and describe shared experience of a phenomena (Creswell & Poth, 2018; Marshall & Rossman, 2016). This study is credible if the findings accurately represent the experience of participants with the digital divide

in the classroom at the site high school. Member checking was the primary technique used to ensure credibility. Member checking is the process of having participants review and confirm interview responses prior to data analysis and is commonly used to validate qualitative research (Creswell & Poth, 2018; Flick, 2018; Marshall & Rossman, 2016). The member checking process was additionally critical to the confirmability of the study as member checking allowed for the removal of any confusion or gaps in participant answers. A reflexive journal was kept during the course of the study to improve credibility and confirmability by ensuring personal bias was considered and bracketed out of the study.

In addition to member checking, dependability was accomplished through creation of an audit trail. This study includes descriptions of codes, rationalizations for data reduction, data analysis, and data displays in order to create an audit trail which explains the path of the researcher in examining teacher experience with the digital divide. The inclusion of participation criteria and interview protocols further adds to the dependability of the study. Participants were selected based on shared experience with the phenomena of the digital divide. The interview protocol then established identical questions and procedures for each interview. Triangulation in the study existed in the member checks and the different teaching assignments represented among participants. Participants taught courses of varied grade levels and subject areas. A larger number of participants might have contributed to greater diversity of teaching assignments and improved validity, but would not have ensured transferability of results. Rather, increased numbers of participants in a phenomenological study leads only to a better understanding of the phenomena (Englander, 2016). Transferability of the results relies on the rich, thick description of participants, and finding similar characteristics in another population.

Ethical Procedures

Effort was taken to protect all participants from potential harm. Protection of human participants is not only a legal requirement, such is central to the trustworthiness of a study (Marshall & Rossman, 2016). All participants in the study were consenting adults. The American College of Education IRB approved the interview format and questions (Appendix C). Participants were informed about the details of the study and of participant protections during the informed consent process (Appendix A). Only IRB approved materials and forms, attached in the appendices, were used in recruiting and obtaining consent from participants. Participants were permitted to withdraw from the study at any time and have corresponding data retracted and destroyed.

According to Marshall and Rossman (2016), existing relationships between researchers and participants is a primary ethical concern in qualitative research. Approval was sought and provided from the school district employing both the researcher and participants as a measure to confirm no conflict of interest existed. To alleviate concerns about the previously disclosed relationships, the researcher informed participants during review of the informed consent form (Appendix A) about confidentiality measures to be employed during the study. The identity of participants was not shared with any administrators at the school and was in no way used for evaluation. Additionally, a reflexive journal was used to practice epoche and ensure existing relationships or views did not influence data collection or analysis. Because interviews were the sole method for data collection, practices to protect participants focused on confidentiality. Participants were reminded not to share any personally identifiable information or the names of students, which might violate educational privacy laws. Pseudonyms were used to code interview transcripts in place of participant names. All identifying data was stored on an

encrypted external hard drive available only to the researcher. Data was kept offline to eliminate the risk of exposure from unauthorized access. All interview transcripts and related data will be destroyed three years after the completion of the study.

Chapter Summary

Chapter 3 gave a detailed description of the qualitative design and methods for the study. A phenomenological approach was the most appropriate design to answer the study's research questions about participants' lived experience. Teachers who have experienced the digital divide in the classroom were purposively sampled and interviewed about personal experience. Data analysis followed the steps described by Creswell and Poth (2018) to provide a description of the essence of the phenomena. Procedures were in place to ensure study reliability and validity, as well as to address ethical concerns, and were discussed. Chapter 4 will present the findings from the study.

Chapter 4: Research Findings and Data Analysis Results

The purpose of this qualitative phenomenological study was to understand teachers' experience with the digital divide in the classroom. Chapter 4 describes the collection of data from participants through semi-structured interviews. The process used to prepare and analyze data is reported in detail. Results are then shared in the form of emergent themes from the data, which address each of the three research questions of the study.

Research Question One: How have teachers experienced the digital divide among students at a rural Title 1 high school?

Research Question Two: How do teachers perceive the role of remediating digital literacy deficiencies among students?

Research Question Three: How are teachers addressing digital literacy deficiencies through pedagogy?

Data Collection

The phenomenological design for the study required data collection from individuals with shared experience of the phenomenon. Participants were purposively sampled from a site high school in southwest Florida. A review of the 95 instructional staff listed on the school website produced the email addresses of 45 teachers meeting the inclusion criteria for this study. Both the total number of teachers at the school and the number qualifying for inclusion in the study were larger than originally expected due to increased student enrollment at the school in recent years.

Each of the 45 teachers were recruited through an introductory email containing the informed consent form (Appendix B and Appendix A). Thirteen teachers, representing 29% of the sample population, responded to the recruitment email over the course of two months. Of the

thirteen teachers who responded to the recruitment email, ten completed the informed consent process and became participants in the study. One teacher responded with interest in participating but was unavailable to meet for an interview, and two teachers who responded to the recruitment email did not respond to the follow up attempting to attain informed consent and schedule an interview.

Permission for the study granted by the local school district restricted interviews to non-district property and one-hour sessions. Interview arrangements were coordinated to prioritize participants' privacy, the conduciveness of audio recording, and minimal interruptive impact. Three participant interviews took place in a private area of a local library branch and three took place in a private office space. Despite attempting to schedule all participants for face-to-face interviews, four participants were interviewed over the phone as a result of inability to meet in person. Each interview was scheduled for a single, one-hour block. The actual length of interview sessions ranged from 20 minutes to 60 minutes, averaging 35 minutes in length.

At the beginning of each meeting and prior to commencing the interview, completion and return of the informed consent paperwork was confirmed for each participant. The informed consent paperwork was then reviewed to ensure participants had no outstanding questions or concerns. Data were collected using a semi-structured interview following the interview protocol (Appendix C). The interview consisted of only five guiding questions to allow participants to freely construct responses conveying personal experience. Questions one through three asked participants to describe experience with the phenomena of the digital divide, which contributed to answering Research Question One. Question four on the protocol further contributed to answering Research Question One by asking for participant perception of the digital divide. The fifth question asked about teacher action and response to the phenomena.

Prompting participant reflection in this area ensured data were provided to answer Research Question Two and Research Question Three. Follow-up questions were asked for clarification as needed. Audio recordings of each interview were made using a digital voice recorder and field notes were taken to compare with transcripts and audio during data analysis.

Within one week of each interview, the participant received a copy of the transcript for the purpose of member checking to ensure accuracy. Participants were given the opportunity to edit or add to original responses at this time. Seven participants completed the member check process completely by acknowledging the accuracy of the transcripts. One participant acknowledged receipt of the transcript but did not respond to verify the accuracy or ask for any changes. Lastly, two of the member checks received no response from the participant.

Data Analysis

All data were stored securely and accessible only by the researcher. Electronic data which were stored on an offline encrypted hard drive included audio recordings, transcripts, and a reflective journal. Paper documents consisting of signed informed consent records and field notes were stored in a locked cabinet. All data will continue to be stored in this fashion for three years before being permanently destroyed. Each participant was assigned a pseudonym for the purpose of labeling and organizing data. Pseudonyms consisted of the word teacher followed by a number from one to ten according to the order of the interviews.

Participants were reminded of the confidentiality procedures prior to beginning the interview and asked not to use actual names in describing personal experience at the school. Despite the reminder, several participants used the names of other teachers or the name of the school itself at some point during the interview. Upon transcribing the audio recordings, identifying names were removed and replaced with four consecutive asterisks to symbolize the

removal. Transcription of each audio recording was completed after listening to the recording multiple times at reduced speed. An initial data reduction process was then undertaken at the time of transcription to remove filler words. Instances of filler words such as *you know, um*, and *uh* were removed from each transcript. The word *so* and phrase *et cetera* were similarly found to be used as filler words in some cases by certain participants. These were removed only where the filler words held no value or meaning to the context of the statement.

The data analysis process began with an immersion in the data by listening to interview audio, reading transcripts, and reviewing field notes multiple times. Data were then loaded into MAXQDA for coding and organization. Remaining data analysis followed the process for phenomenological research described by Creswell and Poth (2018). The next step involved rereading the interview transcripts and marking significant statements. For the primary coding cycle, significant statements were marked with in vivo codes using the highlighting feature in MAXQDA. Significant statements were considered to be any part of a participant response which conveyed personal experience relevant to the research questions. A total of 313 significant statements, ranging in length from a few words to several sentences, were coded in the primary cycle.

The second step in the Creswell and Poth (2018) phenomenological procedure requires grouping significant statements into themes. To identify potential thematic categories, the list of significant statements was isolated and reviewed. Possible topics were listed for each significant statement resulting in a list of 95 topics. Further review of this list revealed potential thematic categories of student groups, access issues, ability and skill levels, usage types and patterns, and teacher strategies. A cluster map was then created to visualize relationships between potential categories and topics (see Figure 1). With the cluster map of potential thematic categories to aid

further data analysis, the list of 313 significant statements was revisited in MAXQDA.

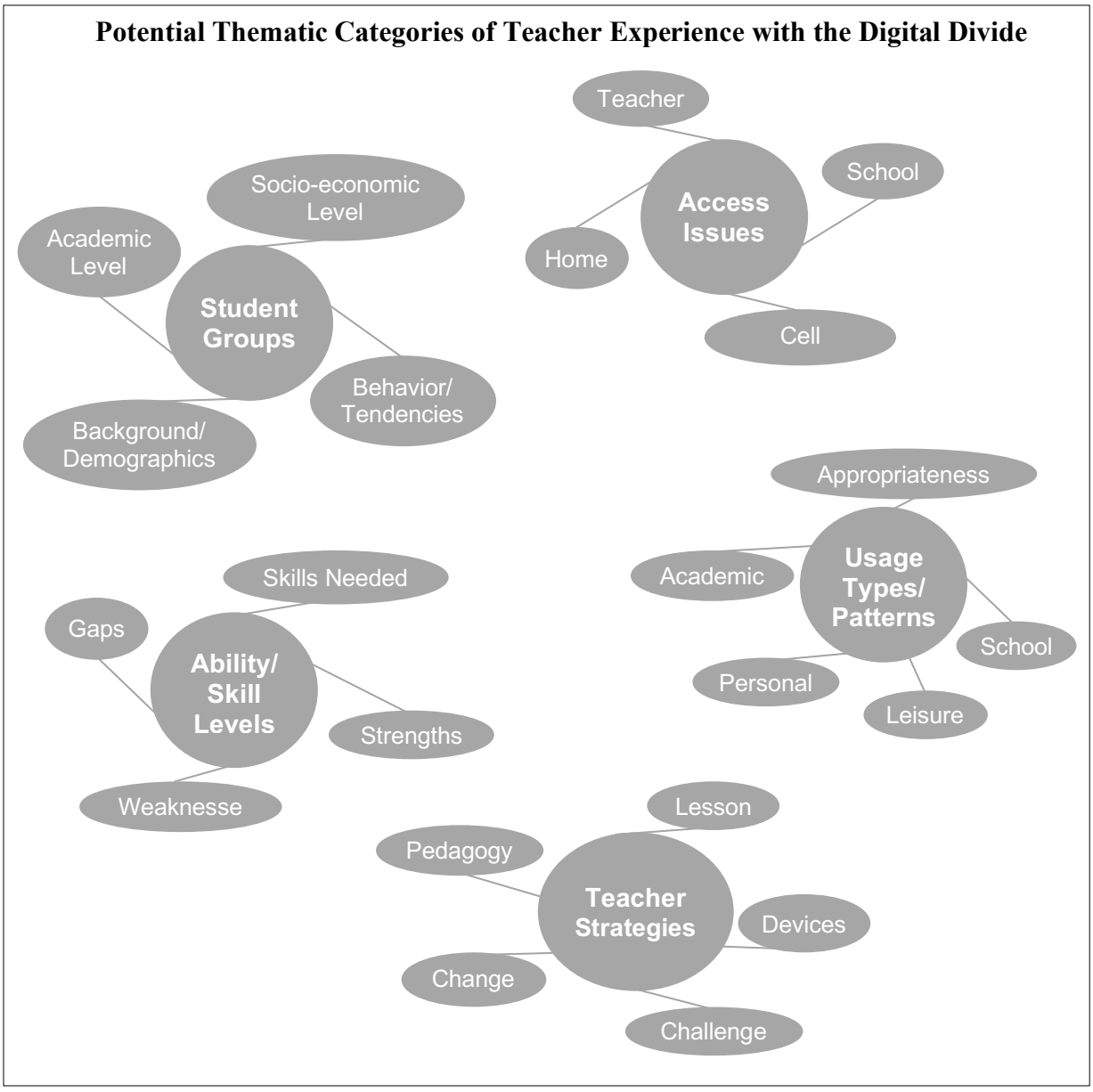

Figure 1. Cluster map of thematic categories found within participants' significant statements.

Significant statements were grouped according to the five thematic categories in a secondary coding cycle. This process validated the original selection of thematic categories. Only four significant statements did not apply to any category. These four statements were reviewed and determined to be significant only for the structural description of how participants

experienced the digital divide. After applying secondary codes, the usage types and patterns category had the lowest number of statements coded ($n = 42$). This number was notably lower than the other categories which averaged 84 coded segments. The category was not dissolved because a theme was clearly present on the topic of usage despite the low number of coded segments.

Following the secondary coding cycle, each thematic category was analyzed individually. All statements were equally weighted during this process. Discrepant statements were found to be alternative reactions by participants to the same phenomena. More specific themes emerged from each category during this analysis. As revealed in the results, only some of the topics associated with each category in Figure 1 were determined to be thematic. Creswell and Poth's (2018) phenomenological analysis process next called for the development of a textural description of what participants experienced. Significant statements were used to emphasize the themes as a description of teacher experience was written for each. Statements regarding physical locations, equipment, and infrastructure were the primary contributors to the structural description. The final step in the analysis process called for a composite description of the phenomenon including the textural and structural elements. Chapter 5 contains this conclusion organized according to study research questions.

Results

Data collected from the ten participating teachers from the site high school produced five emerging themes on experience with the digital divide in the classroom. Each theme is presented in this section along with supporting quotes from interview transcripts. The emerging themes, refined from the earlier identified potentially thematic categories, are (a) variations among groups of students, (b) lack of adequate access, (c) variations in student digital literacy, (d)

student use of technology, and (e) teacher strategies. Table 2 lists the topics comprising each theme and the number of participants making a corresponding statement. Data in the table are not assigned quantitative significance as the data are intended to demonstrate similar themes emerging from diverse perceptions of teachers' experience with same phenomena.

Table 2

Themes Emerging from Participants' Significant Statements

Theme	Number of Participants who mentioned the theme (n = 10)
Variations among groups of students	
English Language Learners (ELL)	7
Socio-economics	7
Academic ability	5
Behavior and motivation	6
Lack of adequate access	
School	8
Home	10
Cell phones	10
Variations in student digital literacy	
Gaps	9
Strengths and weaknesses	7
Student use of technology	
Personal and leisure use	9
Use at school	9
Teacher strategies	
Reactions	10
Pedagogy	10

Variations Among Groups of Students

Each of the participants spoke about differences among groups of students in discussing experience with the digital divide in the classroom. This result contributes to answering Research Question One on how participants experienced the digital divide. One of the most frequently mentioned groups of students was English Language Learners (ELL). Several participants had agreeing statements about substantial differences in the digital divide for ELL

students. One participant said "there is a big difference between the ELLs versus the other class. And their [ELL students] range is huge" (Teacher 4). Another said the gap for these students "is very significant" (Teacher 5). In describing the major differences between some ELL students and other students, one participant stated,

> There's been an uptick in students that don't speak any English and actually don't read in their own native language. So when it comes to internet software, they don't understand it at all. So I mean, it's a zero to 100% type gap there. (Teacher 2)

Seven of the participants referred to students varied socio-economic levels in sharing personal experience. One participant said students of parents who "had more traditional jobs" had access to computers at home and "those parents would even tell me that the students would even have a personal laptop that they could use to do homework" (Teacher 1). The same participant shared about another group of students who do not have access to any computers at home. Teacher 6 agreed stating, "the students that I know come from families who are more prosperous, who have the parents that have higher paying jobs, they are the ones that you see with the more advanced technology." Another participant said of those who lack access, "I mean, we know why, because they're poor" (Teacher 8).

A third distinction in the theme of variations among groups of students was differing academic ability levels. One participant expressed a correlation between academic ability and socio-economic groups in stating the highest-level courses had some students who "come in, pop open their, you know generally an Apple laptop, . . . and they function academically through that device" (Teacher 2). Other participants did not make a connection to socio-economic level, but saw great variation in the digital divide according to course level. A participant, in describing differences between students in regular and honors-level courses, related surprise when students who were "lower-level thinkers" (Teacher 3) in a regular class were able to solve a technology

problem. The same participant described with admiration the ability of honors students to complete notes from online lessons. Teacher 9 experienced better skills among "upper level students" compared to those students in other courses. Relating differences in access to technology, another participant stated,

> Obviously there's a difference between my students in higher level classes, a dual-enrollment class, versus just a regular class. And the obvious reasons in there is that those students who are at the lower levels are in remediation types of classes, don't have the access, or don't have the availability of taking the courses that may include some of that technology. (Teacher 6)

Participants further distinguished students into groups based on behavior and motivation. Most participants mentioned differences among students in these characteristics. One participant referred to varied groups of students anytime work was assigned on computers. "I would say about 10% of them are off task. They'll do anything to be off task. And then there's about 20% that will be looking up and googling how to do something" (Teacher 3). The rest of students were described as following directions as instructed. The participant described allowing off-task behavior to keep from having students who "shut down completely and don't do anything." Another participant explained a group of students is prone to give up for fear of failure:

> Kind anything to stay off task a little bit. I guess a lot of them, but the ones who are good at it, they seem to really get right on it. I mean that's just your different levels of kids I guess. (Teacher 4)

Yet another participant related similar sentiment,

> Now, you're walking around in class and you see some students and you say, okay, well you need to use it for educational purposes. I need you to get off social media and do this and they'll do it. But, there is some students that you won't have to tell them that, they'll be on it and they'll be using it for that right purpose. But there's some students that just want to use it for social media, every time, and it doesn't matter what time of day, what type of an assignment it is, they're still going to use it for that particular purpose. (Teacher 5)

These significant statements about differences among groups of students illustrate how teacher experience with the digital divide in the classroom has been shaped by the characteristics of students in the class. Groups of students discussed by participants included different levels of language proficiency, socio-economic groups, different academic levels, and different motivations. The theme of variations among groups of students was a substantial part of participant experience with the digital divide.

Lack of Adequate Access

The second theme further contributes to answering Research Question One. Lack of adequate access to the Internet and computer devices was part of each participant's experience. Several of the participants spoke about inadequate access for students at school. One participant said "Well, the experience I've had is we don't have a lot of access to technology at [the school] because our resources are limited and [there is] not enough time when it comes to using the resources" (Teacher 5). Some participants mentioned access to laptop carts in citing a lack of access. One participant said "we have three world history teachers. We average 30 plus students in each class, and we're sharing a cart of 16 computers" (Teacher 2). Another participant said,

> I don't think there is enough [access] because we, for example, this year we had a laptop cart in my classroom and it was only 13 laptops and I had 26 students. So they didn't really [have access]. So if some students didn't have, they just had to go without. (Teacher 5)

In addition to the availability of laptops, participants often felt frustrated with devices and the infrastructure in the school as a factor limiting access. Examples illustrating this feeling of frustration include:

> Well, your technology has to work. You have to have enough of it. And this past year that's been a little bit more of a challenge because of the hardware that I had. And it is challenging because that hardware has to work and it has to work consistently, and so if it

> doesn't it'll cause some issues in terms of students being able to do what they need to do. (Teacher 6)

"It's frustrating as all get-out because I can't do what I'm supposed to do without the resources" (Teacher 8).

"We had devices. Part of the problem was they didn't work" (Teacher 4).

"We have a lot of technology issues… the computers, it's just a problem (Teacher 9).

"And you needed them because there was a good chance that you were having to get them fixed all the time" (Teacher 3).

Positive comments about the infrastructure or school-owned devices were made by several participants. One participant believed computers and tablets distributed to different classrooms resulted in "ample access to technology at the school" (Teacher 7). Another participant said, "I got 13 really nice brand-new laptops and that helped a lot" (Teacher 3). The difference in access and availability of technology for teachers was commented on by two participants.

> There's an emphasis on EOC classes and some classes have laptops and tablets and things like that. And I understand that there is a focus on that. But it just seems to, as the elective type classes or regular classes, that do not have any EOC, just get what's left. And like I said, what's left? (Teacher 2)

> I was talking to Mr. Danderson, he's our Office 365 person in our department, and he was telling us that we're getting all this online, well we're getting these laptops and we're getting the tablets, but it's only for his class. So what about the other students in other classes? So what's the use? So they will be well versed for Office 365 in his class, but they go to other classes then nothing. (Teacher 5)

Though some participants have experienced better access than others at the school, all participants stated student's access to technology and the Internet at home had been a problem. One participant shared,

> Once the students leave school, they don't really have access to any technology. So I know one student told me he uses Wi-Fi from McDonald's. He goes there to use it

> because other than that he wouldn't have access to any online access. So, it's very limited. So once they leave to school, that's pretty much it. (Teacher 5)

Other examples supporting the problematic nature of students' home access include:

"But my experience is that when the students go home, they don't have the access" (Teacher 1).

"I would assign assignments and I found out real quick a lot of them did not have computers at home" (Teacher 4).

> They all like to act like they have computer access at home…. And then they would start not completing… and then they tell me "well, I don't have access at home." And so there's less access I think than people think there is. (Teacher 3)

"I'd say about 50% of the [advanced] students. They have access at home. And then I'd say almost 0% of the ELL students, except through their own personal devices" (Teacher 2).

"Maybe a little more than half of our students now have access" (Teacher 10).

Each participant mentioned student ownership and use of cell phones while speaking about the problem of access. Nearly every student had a personal cell phone device and the ownership of cell phones impacted students' access both at home and at school. For several participants, phones were seen as a tool to improve access. One participant stated, "Some of them will walk to the library or do the free Wi-Fi at McDonald's because they have phones that'll connect to the Wi-Fi" (Teacher 1). Another participant said, "I don't think a lot of them have access to a computer, but they can pretty much do everything on their cell phone that they need or that they want" (Teacher 9).

Despite experiencing cell phone ownership by most students, some participants found phones to be of little academic use. The most common issue teachers experienced with students who had phones was lack of compatibility with programs. One participant remarked, "the programs that we're using are not made to be done on phones" (Teacher 1). Another participant said:

> I think sometimes the phones aren't large enough when it comes to memory to be able to download certain things. So therefore you have access to certain things, but not all things because you can access certain things on your phone. (Teacher 5)

Other participants similarly mentioned students having difficulty entering answers or accessing resources on websites through cell phones. One participant said, "If they were to, for instance, access a world history book, they would have to do it through their phone and we've done it in class and tests like that and it takes a long time. It's very difficult" (Teacher 2). These statements illustrate, even with the prevalence of cell phones, access issues have been a significant factor contributing to experience with the digital divide in the classroom.

Variations in Student Digital Literacy

Nine participants described gaps in skill and ability levels from student-to-student or class-to-class as part of the experience with the digital divide in the classroom. This result is an important contribution to answering Research Question One. Despite differences in manifested gaps and explanations for why gaps exist, these participants all agreed students are not uniform in experience or ability with ICT. One participant said "I think probably the biggest challenge that I've had with the project-based learning and the technology is again, that there is sometimes a huge difference in-between students that are in the same class. That's probably the biggest challenge" (Teacher 6). Another participant described simple proficiency in the use of computers as the largest gap which had been experienced while teaching at the school.

Some participants spoke about ability and proficiency gaps in a general manner. One participant only said "student ability varies" (Teacher 1). Another participant found "maybe less than 10% [of students] that we're good at the computer" (Teacher 3). For another participant, ability was linked to a student's experience:

> … look at now versus when I was a kid…. They're so far advanced with computers. A lot of them are, but a lot of them aren't. And that's where these kids, I think they not having computers growing up and doing things on them, has really put them behind the ball. (Teacher 4)

Another participant similarly expressed a general, experiential factor: "it is the students who have access to the technology who seem to be heads and shoulders above everyone else" (Teacher 2).

Other participant statements which cited gaps in specific skills include:

> Some are really great with the digital photography and those kinds of things. And they can put together a great PowerPoint, but if you ask them to put together a Word document in a particular format, it's different. And then vice versa, some know how to use the word processing, but they don't know how to use Prezi or PowerPoint, something like that. (Teacher 6)

"The population I work with, they understand snapchat and Instagram, but they don't really know how to create an email" (Teacher 9).

> I'd say that the top group usually did pretty well with that [Internet research]. I didn't have any issues. They actually came back with a lot of information and a lot of different things. And then, I hate to use percentages, but I would say 75% of them below that were just, it was struggle. They needed a lot of help. (Teacher 4)

In addition to experiencing skill and ability gaps among students, participants additionally experienced areas of general strengths and weaknesses in students at the school. Most of the participants described weaknesses related to academically useful skills. One participant stated,

> Academic technology [ability] I would say is minimal. Now they can find the latest Russian or Chinese site to find movies that are out at the theaters right now, and get around all types of firewalls and things like that. But when it comes to actual access to the academic related technology, very minimal. (Teacher 2)

Several participants commented on Internet research and navigation as a weakness. One participant recalled, "…but looking for information, that's real information, different sources, even looking for an article on something like that, they don't know how to do that" (Teacher 4).

Another participant said in agreement, “research isn’t one of the fortes of students” (Teacher 5). In speaking about this skill, participants expressed the importance of being able to research and find information on the Internet. Further examples of participants mentioning student weaknesses include the following:

“I've had to teach kids how to put in a web address into the Internet browser” (Teacher 1).

“I am really surprised how many students can’t type at all” (Teacher 5).

“They need to learn how to manage: when do you use technology and when to not” (Teacher 9).

“The biggest issue with me… is trying to get them to remember their passwords to get in and out of the programs I need them in” (Teacher 8).

Another area which some participants found to be a weakness for students was in word processing and presentations. One participant said of an assignment,

> It requires a paper and a PowerPoint, and the paper has to be in a certain format. So at the beginning I show them how to format. I go in and I actually show them how to format, push this, you know, this is where you space, this is where you set your margins, et cetera. (Teacher 6)

Participants additionally found word processing and presentations to be a strength for students who had taken a technology course. A participant stated, “there are some kids that know how to use the tools, but they've been through either Mrs. Kellow's classes or some of the things” (Teacher 3). Another participant said, “… it depends, again, if they've been in classes where they've been required to earn the Microsoft certifications. Obviously, the students who have been in those classes and who have taken those classes know how to do things really quickly” (Teacher 6).

Additional student strengths encountered by teachers were often of less academic value. One participant remarked about student skills being greater than the skills of teachers’ with

"applications and phones, and definitely on the gaming side" (Teacher 10). Discussing differences in students, a participant said, "I'd say about 10% are pretty well versed in creating videos or animations, kind of the upper level or echelon type tech skills" (Teacher 2). Another participant said, "Obviously they prefer apps more than going online and looking for stuff" (Teacher 7).

The strengths, weaknesses, and gaps among student digital literacy were a prominent topic for participants. Nine participants spoke about the theme of variations in students' digital literacy. One participant believed all students had the same skill level. The theme is a substantial contribution to the overall shared experience of teachers with the digital divide in the classroom.

Student Use of Technology

Further contributing to answering Research Question One, nine participants talked about the purposes for which students use technology while sharing personal experience with the digital divide in the classroom. As a theme, student use of technology has the least amount of coverage in the transcripts. Despite fewer statements on technology use, the theme emerged clearly from the uniformity of experiences shared by participants. The participants who spoke about students' personal usage outside of school all perceived communication, social media, and games as the primary uses. Examples illustrating this perception include:

"If it's not class related it's Snapchat. I mean it's strictly apps or games" (Teacher 7).

"Gaming, social media, texting, snapchat, all that stuff. Movies. They tell me about watching movies on their phones." (Teacher 8).

"Games and YouTube, and Instagram and all those other social media things. They love their social media too. And they're good at taking pictures" (Teacher 4).

"They use their technology to communicate with each other. They use it for gaming. They use it for entertainment as far as like watching videos or music" (Teacher 10).

Students' predominant use of technology for communication and social media led several participants to describe these uses as the most prevalent within the classroom as well as outside. Participants did not find these uses within the classroom appropriate. One participant said, "If they have any downtime coming in, they're sitting there and I don't know how many times I will come by there: 'put the phone away.' You know, they're playing pool or something like that" (Teacher 4). Another participant said of phones, "They're not allowed in my classroom because they're distractions. They're a total distraction to what's happening…" (Teacher 8). Participants named various websites and software programs utilized in class. These uses are prescribed by the teacher and required of students. The only common academic use of technology participants described students using independently was word processing or presentation programs.

Teacher Strategies

While sharing personal experience with the digital divide in the classroom, each participant relayed the impact the phenomena has on both the students and the teacher. This theme provided a response to Research Question Two on the role of the teacher. Participants described the impacts as changes to practice, contributing to Research Question Three on addressing digital literacy. The theme portrays intentional, strategic reactions and pedagogical modifications to overcome the digital divide. A variety of strategies emerged from participant experience, though each shared a sense of advocacy for students.

The reaction by each of the participants to advocate for students impacted by the digital divide took different forms. Several participants advocated for students by suggesting improvements outside of the individual's classroom. Three participants believed having students

enroll in technology courses would be helpful, even in elementary or middle school before entering high school. One participant said, "I think if they actually have maybe a class for them… where they can go and learn about how to look for things on the Internet. Even Word, Excel, those type things" (Teacher 4). Other participants reacted by advocating for improving infrastructure. One participant stated, "so if [students] had access to the school network, maybe like an open Wi-Fi… it would make things a lot more seamless" (Teacher 2). Another participant stated, "but if students can't have the same access to a laptop or electronic device, then we're falling behind. I just don't know why we can't do that if other districts are doing that…" (Teacher 5).

Some participant's advocacy for students lead to strategies within the individual's classroom. Half of participants described working with students directly to overcome access or ability issues. Examples of these strategies include the following:

"I have the check in check out program with my ten iPads so that students have the opportunity to play with them at home" (Teacher 1).

"You come by and you help them. Say, 'you gotta look, you gotta use your search engines, do some research, look around for different things, look for topics that cover that' and they get frustrated" (Teacher 4).

"Because I do have kids that come to me sometimes and they have known me from years before. They come in the morning. So they don't have access to that aspect of it, the printing, word processing…" (Teacher 10).

"So I had to go back and teach them how to use it before they could successfully complete what I was asking them to do" (Teacher 6).

"We have to model the behavior we want to see. So the behavior we want to see is using technology in a correct way to help their learning and help make learning gains" (Teacher 9).

In addition to advocating for students, participants described reactions impacting how teachers move forward with the curriculum. The majority of participants described having to

cease a practice completely as a result of the digital divide in the classroom. One participant said, “I had to change my complete style of teaching” (Teacher 3) as a result of student ability to use the Internet. Further examples of such a reaction include:

> “They can't access the resources digitally so I have to print out copies of everything so that they can read it actually on paper” (Teacher 2).

> “I didn't do as much this year as I wanted because they were not as good at computers as I thought they'd be” (Teacher 3).

> “It really limits your ability to send work home or have them do something… because they can’t practice at home” (Teacher 8).

> “Well, the only thing you can do as a teacher is for you to do a lot of things in class. That's the only thing that you really can do” (Teacher 5).

> “I would like to bring it up to three rotations as far as in the classroom, but I need more computers” (Teacher 10).

Despite having to end the use of some practices completely, all participants shared strategies to adjust pedagogy to accommodate for the digital divide in the classroom. Nine participants agreed the use of cooperative learning or grouping was a strategy which improved the ability to overcome gaps in technology access and ability. One participant said, “group work is a good way to do that because also, you're going to have people [with] differing abilities, but everybody can do something” (Teacher 6). Another participant said,

> I have found that timed pair share and other types of cooperative learning really helps because you have the students who are going home and immersing themselves in the material, can then share it with the students who go home and do not have the access. (Teacher 2)

Speaking about grouping in order to help those students lacking technology skills, one participant shared,

> With my groupings, I can give an iPad to a group for review or to look something up. I usually get something from the media center, knowing ahead of time that I'm going to

> have that issue. So whether it be a laptop or iPad usually, and I've had, or I'll mix my groups so that somebody in that group has a phone or has access to it. (Teacher 7)

Another pedagogical strategy mentioned by some participants was incorporating instruction on how to use the technology and Internet tools necessary for future assignments and lessons. One participant said, "whenever I do a new program, I have to spend the whole day teaching the program" (Teacher 1). Another participant who similarly uses this strategy said, "I've had to teach the actual how to use a particular skill. And now I kind of just put it in there as part of the lesson, you know, before we're going to do it" (Teacher 6). Additional pedagogical strategies shared by participants included offering students impacted by the digital divide choices on assignment types or more time to complete assignments with digital components. Despite one participant claiming to revert "back to the stone age paper and pencil type thing" (Teacher 2) as a result of the digital divide, all participants described continued use of assignments and lessons with digital components for students.

Reliability and Validity

The findings of the study maintain credibility as a result of strategies employed to ensure reliability and validity. A member-checking process was implemented to validate data gathered from participants. Each participant was emailed a transcript of the interview and given the opportunity to review, add to, or edit responses. This process helped ensure the accuracy of all interview data. A reflexive journal further served to enhance credibility and confirmability. The journal was used to reflect on personal bias and bracket such experience out of the study. Acting as a field book, the journal was further used to record and reflect on each step taken during the course of data collection and analysis.

An audit trail was maintained throughout the study in order to establish dependability of

the results. The audit trail includes descriptions of codes, rationalizations for data reduction, data analysis, and data displays explaining the path of the researcher in examining teacher experience with the digital divide in the classroom. Inclusion criteria for participants and interview protocols added to the dependability of the study. Participants were purposively sampled from teachers at a high school in a rural, agrarian community in southwest Florida. Limiting participants to current teachers with at least three years of service at the school ensured participants had a shared experience with the phenomena. All ten teachers who completed the informed consent process became participants in the study. The study would have accepted up to 15 participants, though saturation was reached after collecting data from the ten teachers who volunteered to participate. Transferability of the results is not impacted by the number of participants in a phenomenological study, but by finding similar characteristics in another population.

Chapter Summary

Chapter 4 detailed the findings of the study exploring teacher experience with the digital divide in the classroom. The processes for recruiting participants and data collection through semi-structured interviews were described. Data analysis processes and coding procedures were explained. The major themes from the interviews with teachers were described with quotations as supporting evidence. Themes were organized by topic and subtopic to answer each research question.

Chapter 5 provides further interpretation and analysis of participants' experience with the digital divide in the classroom. Study limitations will be provided in addition to recommendations for future research. Finally, Chapter 5 concludes with the implications this research study holds for school and district leaders addressing the digital divide.

Chapter 5: Discussion and Conclusion

The purpose of the study was to understand teachers' experience with the digital divide in the classroom. Prior to this study, research had not been conducted to understand how teachers perceive and address the digital divide within the classroom. This study sought to contribute to the field of knowledge by addressing the lack of research on teacher experience despite evidence suggesting the persistence of the digital divide. The study was designed to answer three research questions:

Research Question One: How have teachers experienced the digital divide among students at a rural Title 1 high school?

Research Question Two: How do teachers perceive the role of remediating digital literacy deficiencies among students?

Research Question Three: How are teachers addressing digital literacy deficiencies through pedagogy?

Results from phenomenological interviews conducted with ten participating teachers from the site school are detailed in Chapter 4. Five themes emerged from the data as key findings which answer this study's research questions. The themes of variations among groups of students, lack of adequate access, variations in student digital literacy, and student use of technology all answer Research Question One. These four themes explain how teachers have experienced the digital divide among students at the school. Research Question Two is answered by the theme of teacher strategies. This theme encompasses the reactions of teachers to the digital divide and students' digital literacy deficiencies. Teacher strategies as a theme further answers Research Question Three regarding the way teachers are addressing digital literacy deficiencies through pedagogy. The theme includes predominant strategies used by teachers

within the classroom.

Findings, Interpretations, Conclusions

This section presents the findings, interpretations, and conclusions of the research organized by the study's three research questions. The findings were compared to what was discovered in the literature reviewed in Chapter 2. Interpretations are presented within the context of the theoretical framework for the study.

Research Question One

The first research question, "How have teachers experienced the digital divide among students at a rural Title 1 high school?" revealed four themes: variations among groups of students, lack of adequate access, variations in student digital literacy, and student use of technology. These themes affirm the presence of clear digital divides at the school where participants in this study teach. The divides, and how instruction is impacted, can differ by teacher.

Variations among groups of students. The experience of participants with the digital literacy skills and Internet access of students revealed a lack of uniformity across students. Participants spoke about different groups of students, mentioning variations in access and digital literacy levels by group. The groups included ELL students, students from low-SES households, students in advanced or regular academic level classes, as well as students who are motivated to learn and use technology. Participants cited these various groups to illustrate the extreme dichotomy between students in the classroom, equating the digital divide.

Variations in access and digital literacy skills among students exemplifies the existence of the digital divide within classrooms at the site high school where participants in the study teach. The review of literature in Chapter 2 predicted the existence of differences among various

groups of students. Several studies have demonstrated a digital divide by SES (Cruz-Jesus et al., 2016; Haight et al., 2014; Serrano-Cinca et al., 2018; van Deursen & Helsper, 2015; van Deursen & van Dijk, 2014). The literature reviewed did not identify ELL students, though these students may be included as part of another at-risk category. Academic and motivation levels were not groups identified in the literature as likely to be impacted by the digital divide.

As experienced educators, participants feel challenged to meet the needs of all students. Participants teach a variety of subjects, academic levels, and types of students. Access to technology and digital literacy levels are among the needs recognized in participants' classrooms. Categorizing students into groups based on these needs has helped participants adapt to the phenomenon of the digital divide.

Lack of adequate access. Students' lack of adequate access to computers and the Internet has been an important aspect of participants' experience with the digital divide. The majority of students within participants' classrooms have less than ideal access, especially to computers at home. Illustrating the divide, other students have regular access. Availability and reliability of resources at the school is an additional concern for participants.

Lack of adequate access within the school is frustrating for participants. Such frustration is often the result of existing resources requiring repair or infrastructure failure. This result affirms the findings of Gonzalez (2016), who claimed individual access is a complicated matter subject to repair and maintenance issues. In addition, teacher access to resources within the school is not uniform. Some courses and subjects are given higher priority to newer technology and are issued more computers than counterparts in other areas. Teachers of courses given priority are less likely to be impacted by the access divide at school.

Participants were less frustrated with students' lack of access outside of school. Home

access issues are accepted as a challenge which all teachers at the school face. Participants have largely been left to develop individual solutions to this divide in access among students. The research confirmed Cohron's (2015) finding which indicated mobile phone use was a factor in the evolution of the access divide. Accessing the Internet and digital resources through students' cell phones, which participants felt almost every student at the school has, is one apparent solution. Cell phones can be used by students both at and away from the school, though participants' experience has revealed ownership of a cell phone does not necessarily equate to Internet access at home. Cell phones have further failed as a solution when desired programs and resources are not compatible with mobile platforms.

Variations in student digital literacy. Literature reviewed in Chapter 2 demonstrated the existence of a spectrum of digital literacy skill levels (Dolan, 2016; Horrigan, 2016; Huffman, 2018). The literature suggested several factors which might influence digital literacy levels, including SES, age, and race. The research corroborates the literature on the topic of digital literacy skills, finding participants have experienced a wide range of digital literacy skills within the classroom. Participants were acutely aware of the student skill levels, but some struggle to understand how gaps have developed.

Participants expect students to have sufficient digital literacy skills and prefer students with higher skill levels. Individual digital literacy levels were claimed to range from nonexistent to advanced. These gaps were apparent to participants among students within individual classrooms and from one class to another. Several participants believed student completion of technology courses offered at the school factored heavily into digital literacy gaps. These elective courses teaching computer science and software programs are offered to interested students as part of the school's Information Technology academy.

Previous experience with computers and SES were additional factors which participants believed to be impacting student digital literacy. Participant's associated the age from which students have been exposed to computers with accumulated digital literacy skills. This exposure was linked to household SES. Participants expressed students from higher-income households having greater exposure to computers resulting in higher digital literacy levels than other students.

The concept of digital literacy includes functional elements relating to the use of computers and navigation of the Internet, as well as communication elements relating to the interpretation and creation of information using ICT (Buckingham, 2015; Chetty et al., 2018). Participants found specific skills from both realms to be lacking among students. Examples of lacking functional skills mentioned by participants included logging on to computers, typing, and entering web addresses. Lacking communication elements cited included Internet searches, information interpretation, and presentation design. The wide spectrum of digital literacy levels and needs has complicated participants' ability to address specific areas of weakness.

Student use of technology. Differences in how the Internet is used among a population is not associated with access, but rather with income level, education level, employment status, and age (Serrano-Cinca et al., 2018; van Deursen & van Dijk, 2014). Participants have experienced the same Internet usage patterns across the entire student body, whose membership in the adolescent age group is the single homogenous characteristic. These results support age as the only differentiating factor in Internet use. Tang and Patrick (2018) found those in the adolescent age group spend the most time on games, texting, and social media sites. Participants likewise experienced communication, social media, and games to be the overwhelmingly predominant uses of the Internet by students.

Students' predominant use of the Internet for leisure activities such as social media and gaming was problematic for participants as such usage seeped into the classroom. Participants were aware of the powerful benefits the Internet can bring to the classroom. Despite supporting use of ICT in the learning process, a negative connotation has been added due to student usage patterns. Participants have to exert additional effort to closely monitor student ICT usage in the classroom, ensuring usage is for the correct academic purpose. Some participants felt the monitoring, and subsequent correction of behavior, was an inevitably ongoing battle with less-motivated students.

Research Question Two

The second research question, "How do teachers perceive the role of remediating digital literacy deficiencies among students?" contributed to the emergence of one theme: teacher strategies. This theme demonstrates teachers' recognition of the importance of digital literacy. Though important, teachers have different perceptions about how to best help students improve digital literacy.

Teacher strategies. Formal education through public-school systems is a potential method to address the digital divide (Adrion et al., 2016; Eynon & Geniets, 2015; Fluck et al., 2016; Lisenbee, 2016; Zilka, 2016). Teachers are an essential part of any education initiative. Participants in the study perceived the role of the classroom teacher in developing students' digital literacy skills as an advocate for progress. Teachers at the school recognize the importance of digital literacy, desiring for students to acquire and improve such skills. Though all participants felt a responsibility to advocate for students' advancement, reactions to the digital divide took various forms.

Literature reviewed in Chapter 2 suggested teachers can be unaware of students' actual

digital literacy skills, assuming all students are digital natives with high skill levels (Eynon & Geniets, 2015; Kirschner & De Bruyckere, 2017). Results from the study do not support the literature in this area. Most participants were acutely aware of students' digital literacy levels. For some participants, the role of advocate meant a direct responsibility to support students individually who struggle with digital literacy. This reaction led to encouraging behavior and occasional instruction on specific skills. Other participants advocated indirectly by seeking increased access and training for students. These participants believed deficiencies could only be solved by outside interventions such as specialized classes. Despite the potential responsibility of public schools to target the digital divide, teachers have not been trained or instructed on how to address digital literacy deficiencies within the classroom.

Research Question Three

The final research question, "How are teachers addressing digital literacy deficiencies through pedagogy?" further contributed to the development of the teacher strategies theme. This theme illustrates the variety of strategies teachers employ to address digital literacy skills. The strategies have been developed individually without training or collaboration.

Teacher strategies. This study found participants have developed individual pedagogical strategies to accommodate for the digital divide in the absence of training. Among these strategies are those which teachers feel forced to implement or change. Teachers have been compelled to stop assigning homework, limit assignments and activities with digital components, and change delivery methods as a result of students' digital capabilities. Participants' necessity to cease desired instructional strategies signaled a degradation of instructional quality brought on by the digital divide.

Participants shared strategies developed to support continued use of ICT for teaching and

learning. Grouping students by digital literacy level and application of cooperative learning strategies are the two most powerful pedagogical practices teachers have found to accommodate instruction for the digital divide. These strategies allow teachers to make use of ICT within the classroom in addition to encouraging growth in individual students. Some participants found further success by taking time to provide direct instruction on a specific digital literacy skill prior to asking students to utilize the skill in the classroom. This instruction is not prescribed by the curriculum but did enable implementation of the established curriculum.

Participants described the pedagogical strategies developed individually to accommodate the digital divide as successful. Despite discovery of some successful strategies, participants have not experienced any training on adjusting pedagogy to address the digital literacy skills of students. Teachers are not giving or receiving advice from each other on the challenges created by the digital divide. The lack of training and professional development in dealing with the digital divide in the classroom has led to fragmented reactions and approaches by teachers.

This study was conducted under a theoretical framework drawing on constructivism as a theory of learning. The constructivist theory contends knowledge is actively constructed in the mind of the learner, as opposed to transmitted from one person to another. Adopting a constructivist framework allowed the study to consider participant's own experience with the digital divide and how the experience shaped individual understanding of the phenomena. In addition to emerging as a finding towards the study's research questions, the teacher strategies theme further validates the use of a constructivist framework for the study. The theme demonstrates how teachers have developed individual perceptions and strategies based on personal experience, not based on information learned from training or professional development.

Limitations

This study focused on the lived experience of teachers with the digital divide in the classroom at a Title 1 high school in a rural, agrarian community in southwest Florida. The study presented the participants' experiences, which may or may not be the same as the experience of teachers in other communities and school districts. Transferability of the results will be especially limited for teachers at schools with contrasting demographic populations. A limited and purposive sample was used to recruit participants. Participants may have sensed a duty to take part in the study based on strong feelings or frustrations on the subject of the digital divide.

Confidence in the credibility of the study is enhanced through use of a purposive sample who have shared experience of the phenomenon with at least three years of service at the site school. In addition, credibility is furthered by expert-recommended steps taken during data collection and analysis to ensure accuracy. Participants' lived experiences as shared in individual interviews are accurately represented in the findings and conclusions. Although these findings and conclusions cannot be considered universal or extended to a larger population of teachers, another group of teachers from a similar school and with equivalent student demographics might produce comparable results.

Recommendations

As schools continue to seek to prepare students to be productive citizens and work to close the digital divide to achieve such an end, there is a need to consider the role of the classroom teacher. The digital divide persists in ICT access, use, and benefits (Horrigan, 2016; Ryan, 2018). Public programs, such as those instituted through schools, have failed to adequately eliminate the divide (Helsper & van Deursen, 2017). This research study strongly

suggested teacher experience with the digital divide can have a profound impact on classroom instruction. Teachers at the site school see themselves as advocates for improving student ICT access and digital literacy, but not all take direct action to make an impact on individual students. Teachers have identified strategies for accommodating students and improving digital literacy, although the effectiveness of these strategies has not been measured. Future studies are recommended to focus on specific strategies classroom teachers can use to limit the impact of students with insufficient ICT access or skill, and the effectiveness of pedagogical strategies on improving students' digital literacy skills.

Especially in schools where student demographics are likely to enhance the digital divide, teachers and school leaders should pay close attention to students' ICT access at home and at school, as well students' digital literacy skill levels. The impact of lacking access or digital literacy skills can not be overlooked. School leaders should implement methods to measure students' digital literacy and the additive value classroom teachers can provide in addition to existing technology classes. To increase capacity of all classroom teachers in addressing the digital divide, professional development should be provided to teachers in the following areas: the role of the classroom teacher in remediating digital literacy skills, accommodating students lacking access without compromising instruction, and pedagogical strategies to accommodate students of varying digital literacy levels within the same classroom. Improving access for students at home, and even within a school, is not a simple solution. Regarding the district involved in this study, planning should be undertaken to engage students, families, and the community in an effort to provide additional ICT resources to this school to improve access equity with schools from surrounding communities.

Implications for Leadership

While society is generally aware of the importance of learning to use computers and the Internet, programs and models aimed at closing gaps in the digital divide have largely ignored the role of the classroom teacher. Participants in the research study shared how the digital divide in ICT access and digital literacy skills impacts daily classroom instruction. Teachers, frustrated by access constraints at the school, are forced to modify desired instructional strategies to accommodate for student access and ability levels. In the absence of training on the subject, teachers have resorted to implementing individual solutions and advocating for students impacted by the digital divide.

The results of the study hold implications for teachers, school, and district leaders seeking positive social change. Closing the digital divide might mean breaking the cycle of poverty in some communities (Bach et al., 2018). Teachers could work towards closing the divide by providing direct instruction on digital literacy skills needed by students. Like skills in any other subject, regular instruction is necessary for students to improve digital literacy skills. School leaders could support teachers in this effort by incorporating digital literacy initiatives into core curricula in addition to continued offering of computer science courses.

School leaders could further affect positive change by facilitating professional development on the digital divide and allowing teachers to share best practices. Teachers are often expected to routinely engage with each other within professional learning communities to plan, carry out, and measure instruction. Sharing of best practices and effective strategies could be built into this structure by school leaders. District and school leaders could have further positive impact by allocating resources to schools and areas of the community with the greatest

need. Improvements to school access and infrastructure might reduce teacher frustration and enable more effective instruction in all curricular areas.

Participants demonstrated care for student success, as evidenced by the perception of the teacher's role as one of an advocate. Teachers endorse increasing student access and digital literacy skills. School and district leaders should welcome the supportive attitude of teachers. Shifting the mindset of teachers to provide direct instruction on digital literacy within the classroom, and supporting efforts to increase the effectiveness of this instruction, could swiftly affect change. Societal investment in this area could bring about immeasurable improvement in the future.

Conclusion

The purpose of the study was to understand teachers' experience with the digital divide in the classroom. Findings of the study indicate teachers are profoundly aware of gaps in students' access to ICT and digital literacy skills. These gaps impact everyday instruction in the classroom despite teacher advocacy for students. The study produced some effective strategies for accommodating students but further found teachers are not sharing or being trained on such strategies. Addressing the role of the classroom teacher in closing the digital divide holds tremendous potential for closing the digital divide.

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Appendix A: Informed Consent Notice

Informed Consent Information

Directions for Prospective Participant
Please Read this consent form carefully and ask as many questions as you like before you decide whether or not you want to participate in this research study. You are free to ask questions at any time before, during, or after your participation in this research.

Project Title: Examining Teacher Experience with the Digital Divide in the Classroom: A Qualitative Study

Lead Researcher: Benjamin Weber
Email: benjamin.weber@educate.ace.edu **Phone:** (740) 424-9259
Supervising Faculty Member: Dr. Katrina Schultz, American College of Education

Introduction
My name is Benjamin Weber and I am a doctoral student at American College of Education. I am conducting research under the supervision of Dr. Katrina Schultz. I will give you information about the study and invite you to participate. Please read this information carefully and ask for clarification of any questions you may have.

Purpose of the research
My research is on the experience of teachers with gaps in students' technology use and skills. Exactly what impact these gaps have in the classroom is not clear in current research or articles. It is my hope that understanding how teachers experience gaps in students' technology use and skills will allow both teachers and school leaders to plan solutions.

Methodology
This research will involve your participation in an interview with me that may take up to one hour to complete.

Participant Selection
You are being invited to participate in this research because of your experience at Immokalee High School. I believe your experience in the classroom can contribute to the understanding of technology related gaps among students.

Voluntary Participation
Your participation in this research is entirely voluntary. The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

Procedures
I am inviting you to participate in this study to understand teacher experience. If you accept, you will be asked in an interview to describe your experience in the classroom related to gaps in students' technology use and ability. Approximately fifteen teachers will be asked to complete such an interview. The interview will be recorded, transcribed, and provided to you for any changes or clarifications. The data will be organized, categorized, and analyzed for repeated themes.

Duration
Individual interviews will be scheduled at a time convenient for the participant and may last up to one hour depending on participant description of their experience. Within two weeks of the interview, the participant will receive a written transcript of the interview in order to review and make changes to their responses if necessary.

Possible Risks
All precautions will be taken to reduce risk to participants. Participants may decide to withdraw at any time and have their associated data discarded. Interviews will take place outside of work hours to reduce impact on participants. Interview questions will be generally structured to ask about teacher experience in the classroom. Participants will have a chance to review and edit their responses after the conclusion of the interview, they may also skip any question or research process which causes discomfort. Participants will be asked not to use proper names or to reveal any confidential student information during interviews.

Possible Benefits
There is no financial or evaluative benefit for your participation. However, by sharing your experience with the digital divide in the classroom you will contribute to understanding this phenomenon. Such an understanding might benefit teachers and leaders at your school and others in designing solutions for students impacted by the digital divide.

Confidentiality
I will not share information about you or anything you say outside of the research report. Data will include direct quotations but will be coded with a number and not linked with your name. Only I will know your number and I will secure that information. Your name will not be associated with the research in any way. The school and district will also remain unnamed in the research report, further protecting your anonymity.

Sharing the Results
The results of the study will be shared with American College of Education in my dissertation. The university library system will publish the dissertation. All participants will be given a copy of the dissertation upon request.

Right to Refuse or Withdraw
Once again, you are under no obligation to participate in this study. Should you decide to participate, you may withdraw at any time and your associated data will be discarded.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact me at Benjamin.weber@educate.ace.edu. This research plan has been reviewed and approved by the Institutional Review Board of American College of Education. This is a committee whose role is to make sure that research participants are protected from harm. If you wish to ask questions of this group, email IRB@ace.edu.

Certificate of Consent

I have read the information about this study. I have had the opportunity to ask questions about the study, and any questions have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Print or type name of participant: _____

Signature of participant: _____ Date: _____

I confirm the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered to the best of my ability. I confirm the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Print or type name of lead researcher: _____

Signature of lead researcher: _____ Date: _____

Appendix B: Recruitment Email

Prospective research participant:

I am a doctoral student at American College of Education. I am writing to let you know about an opportunity to participate in a dissertation research study about the experience of teachers with gaps in students' technology use and skills. The study will consist of interviewing teachers at Immokalee High School about experience with these gaps, which are often referred to as "the digital divide." You were identified to participate in this study because of your classroom experience at the school and the subject you teach. Attached is information about the study. You are not obligated to participate. If you are interested in participating after carefully reading this information, please ask for clarification of any questions you may have and return the attached consent form. You may contact me from a personal email address at benjamin.weber@educate.ace.edu or reply to this message.

Thank you for considering this dissertation research opportunity.

Regards,

Benjamin Weber

Appendix C: Interview Protocol

Semi-structured Interview Protocol

Date: _____ Method: in person video conference

Interviewer: _Ben Weber_ Interviewee: _____

Instructions for the Interviewer (Ben Weber)

Following necessary introductions, the interviewee should be informed about the study and the purpose of the study. The interviewer should review the Informed Consent Notice with the interviewee, reminding the interviewee specifically of the right to refuse or withdraw and protection of participant identity. Prior to asking the following questions, the interviewer should remind the interviewee the study only considers participant experience in the classroom at the site high school.

1. Tell me about your experience at the site regarding student access to computers and the Internet.
    a. Clarifications based on participant answers and field notes
2. Tell me about your experience at the site regarding student ability with digital technologies.
    a. Clarifications based on participant answers and field notes
3. Tell me about your experience at the site regarding types of digital technology use among students.
    a. Clarifications based on participant answers and field notes
4. Tell me, based on your perception, what gaps exist among students in terms of digital technologies?
    a. Clarifications based on participant answers and field notes
5. What do you do when you discover student inadequacies with digital technologies?
    a. Clarifications based on participant answers and field notes

Appendix D: Validation Rubric for Expert Panel

Survey/Interview Validation Rubric for Expert Panel - VREP©

By Marilyn K. Simon with input from Jacquelyn White

http://dissertationrecipes.com/

Criteria	Operational Definitions	Score **1=Not Acceptable** (major modifications needed) **2=Below Expectations** (some modifications needed) **3=Meets Expectations** (no modifications needed but could be improved with minor changes) **4=Exceeds Expectations** (no modifications needed)				**Questions NOT meeting standard (List page and question number) and need to be revised.** ***Please use the comments and suggestions section to recommend revisions.***
		1	2	3	4	
Clarity	• The questions are direct and specific. • Only one question is asked at a time. • The participants can understand what is being asked. • There are no *double-barreled* questions (two questions in one).					
Wordiness	• Questions are concise. • There are no unnecessary words					
Negative Wording	• Questions are asked using the affirmative (e.g., Instead of asking, "Which methods are not used?", the researcher asks, "Which methods *are* used?")					
Overlapping Responses	• No response covers more than one choice. • All possibilities are considered. • There are no ambiguous questions.					
Balance	• The questions are unbiased and do not lead the participants to a response. The questions are asked using a neutral tone.					
Use of Jargon	• The terms used are understandable by the target population.					

	• There are no clichés or hyperbole in the wording of the questions.					
Appropriateness of Responses Listed	• The choices listed allow participants to respond appropriately. • The responses apply to all situations or offer a way for those to respond with unique situations.					
Use of Technical Language	• The use of technical language is minimal and appropriate. • All acronyms are defined.					
Application to Praxis	• The questions asked relate to the daily practices or expertise of the potential participants.					
Relationship to Problem	• The questions are sufficient to resolve the problem in the study • The questions are sufficient to answer the research questions. • The questions are sufficient to obtain the purpose of the study.					

* The operational definition should include the domains and constructs that are being investigated. You need to assign meaning to a variable by specifying the activities and operations necessary to measure, categorize, or manipulate the variable For example, to measure the construct *successful aging* the following domains could be included: degree of physical disability (low number); prevalence of physical performance (high number), and degree of cognitive impairment (low number). If you were to measure creativity, this construct is generally recognized to consist of flexibility, originality, elaboration, and other concepts. Prior studies can be helpful in establishing the domains of a construct.

Comments and Suggestions