THE IMPLEMENTATION

OF MOBILE DEVICES IN THE MIDDLE-LEVEL

CLASSROOM ENVIRONMENT

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Title of Study: THE IMPLEMENTATION OF MOBILE DEVICES IN THE MIDDLE-

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Abstract: The purpose of this qualitative case study is to understand administrator and teacher perceptions of their ability to effectively implement the use of mobile devices in a rapidly changing, high-stakes accountability environment at the middle-level in three purposefully selected middle schools in a public school district in the Midwest. Data for this qualitative case study was collected and analyzed through Rogers' (1995) theory of Diffusion of Innovations. The study participants were middle school principals and teachers. Data collection consisted of single interviews and observations that were subsequently analyzed and compared. Data indicated the relative advantage of the mobile devices was not clearly communicated to the participants and negatively impacted the diffusion. Data also indicated that when implementing the devices, the district needed to continually adjust the way they addressed the complexity for participants. Finally, data indicated the social system of the school and the district had a positive influence on teacher and administrator perceptions of their ability to diffuse the innovation. Future studies comparing the innovativeness of district leaders, technology leaders, site administrators and teachers over the implementation of a new innovation, how training impacts diffusion of an innovation, diffusion of an innovation in relation to teacher experience levels, and how incentives influence the diffusion of an innovation.

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CHAPTER I

INTRODUCTION

Changes in Public Education

K-12 public education is facing multiple change initiatives such as the revision of

No Child Left Behind (NCLB, 2011) as the Every Student Succeeds Act (ESSA) (ESSA,

Pub. L. No. 114-95. § 114 Stat. 1177, 2015). This law, enacted at the federal level and

implemented at the state level, standardizes accountability measures. It is enacted through

federal and state initiatives and mandates that challenge the established educational

systems and create a desire to find and maximize the highest-yield instructional strategies

and resources (Salpeter, 2012) for educational improvement. As a response to these

changes, and in order to meet student needs, public school districts are implementing

various innovations to become more efficient in maximizing instructional resources

(Salpeter, 2012). The role of the teacher and innovative classroom strategies are

instrumental in meeting these challenges. Marzano (2008) stated that effective

educational reform begins in the classroom where instructional strategies are

implemented daily. The use of technology, and more specifically, mobile devices by

schools, is one of the innovations that K-12 education is leveraging to meet educational

mandates and to prepare today's students for tomorrow's world (McLester, 2012).

The marketplace supports the integration of technology into classroom instruction. Prensky (2012) noted that "companies, from startups to giants, now require a 'digital strategy'" (p. 23) to stay competitive and up to date. In response, and to provide access to new technology, many local districts are beginning to create a "digital strategy" to support an instructional leader's ability to navigate the change initiatives affecting public education (Schachter, 2009). Recent innovations in mobile devices have allowed individuals the potential to replace larger, non-mobile devices, such as desktop computers and laptops, with tablets and smart phones that can not only do the same work but also allow user information to be accessible on all devices at any time (Phin, 2010). However, as principals' and teachers' ages vary, two groups have emerged relating to the use of mobile devices as instructional tools (Kukulska-Hulme, 2013). The first group is comprised of those new to the use of mobile devices; they are learning how to utilize the mobile devices for greatest effectiveness and weighing benefits of integrating technology into instructional practices. The second group is or has become "digitally wise" and, having already experienced the benefits of mobile devices, are searching and creating more ways, as Prensky (2012) indicated, to "leverage what they do and to increase the effectiveness of their practices" (p. 24).

The integration of technology holds promise for students at all grade levels; however, the effects of innovation are especially important at the middle school level where middle school students encounter a variety of challenges. Brown and Knowles (2014) discussed the various challenges for middle level educators related to adolescent development. Included in these challenges is inconsistent cognitive, emotional, and physical development of middle school students that add to the burdens of meeting individual student needs that are already

impacting public education. An example of some of the challenges students face include adolescent brain development impacted by the influx of hormones due to beginning puberty (Association for Middle Level Education, 2010). Additionally, compounding the challenges for students is the social pressure from peers leading to potential emotional duress. Additionally, it is important to note that middle level students' success in middle school significantly contributes to success completing K-12 public school (Rosin, 2011).

Problem Statement

Implementing mobile devices in the middle-level learning environment is becoming common practice due to the recognition, by policy makers and instructional leaders, of the importance of teaching 21st century skills in the classroom. However, implementation of mobile devices as an instructional strategy has been successful in some instances (McCaffrey, 2011) but not in others (Hart, 2012). Several reasons have been suggested for failure to adequately integrate mobile devices in the learning environment. For example, the expense and time in training teachers to implement mobile devices has seen mixed results (Holcomb, 2009). Specifically, in some cases, integration of technology has been taxing because of the need for time devoted to training teachers to use the devices as an instructional strategy. Additionally, implementation of mobile devices, in some cases, can be taxing on financial resources (McLester, 2012). Another possible reason that implementation of mobile devices has seen mixed results is that teachers and administrators are burdened with a large number of changes to their field from the state and federal levels; therefore, there may be internal struggles as teachers seek to implement mandated high stakes accountability policies while also learning to implement new instructional strategies using technology.

Purpose Statement

Implementing mobile devices in a middle-level learning environment has immense potential for enhancing learning outcomes (McCaffrey, 2011) and connecting student skills to the skills that they will need when they enter the marketplace. Therefore, it is important to understand, from teacher and administrator perspectives, some of the challenges and opportunities that arise when mobile device technology is introduced into the learning environment. The purpose of this qualitative case study is to understand administrator and teacher perceptions of their ability to effectively implement the use of mobile devices (MDs) in a rapidly changing, high-stakes accountability environment at the middle-level in three purposefully selected middle schools in a public school district in the Midwest.

Therefore, the following research questions will be used to guide this study.

1. What are teachers' and administrators' perceptions about the challenges and opportunities that arise from integration of mobile devices in the learning environment?

2. What factors influence their ability to implement mobile devices into the middle-level learning environment?

3. How do these teachers and administrators navigate the challenges they face to implement mobile devices?

4. How do these teachers and administrators synthesize current change initiatives in the implementation process?

Theoretical Framework

Qualitative research is based on understanding and discovering experiences, relationships, and thoughts of participants (Harwell, 2011). The epistemology of this qualitative case study is based in constructivism due to the uniqueness of the environment in

which research takes place (Crotty, 1998). Constructivism focuses on how learners construct meaning from their experiences (Crotty, 1998). Due to the variances that are possible in the participants and settings, qualitative research studies are unique. Research design of a qualitative nature and the type of study determines the use of theory (Creswell, 1998). Bryant (2004) provides guidance in deciding whether to use theory in the study and the placement of the theory as a lens to view results.

A theoretical framework provides a reference point for the researcher to explain occurrences; it provides the researcher with a lens to address queries and problems discovered in the research process (Anfara & Mertz, 2006). A theoretical framework also ensures that the type of investigation proposed is not based on guesses or personal instinct (Simon & Goes, 2011). Rogers' (1995) Diffusion of Innovations is an appropriate theoretical framework to explain findings from this study because it will provide a lens to analyze the participants' willingness to transition from the use of traditional instructional practices to the use of mobile devices. Rogers' Diffusion of Innovations (DOI) is comprised of four main elements: innovation, communication, time, and social system (Rogers & Scott, 1997). The first element, innovation, is broken into four pieces that determine the diffusion of innovation, in this case mobile devices, in a social system. These pieces include: relative advantage, compatibility, complexity, trialability and observability to those people within a social system (Rogers, 1995). The theoretical framework of Diffusion of Innovations is used to analyze findings from this study through each of these lenses.

Procedures

5

This study employs a case study approach because it focuses on the implementation of mobile devices in three of six middle schools in a purposefully selected public school district. The participants will include site administrators and teachers. The reason that this district was chosen is that this district is working on a digital conversion plan to implement a one-to-one (1:1) mobile device initiative. The three middle schools that are chosen for this study are selected because they represent a cross section of the middle schools within the district as represented by their student population, free and reduced lunch count, and age. As a qualitative researcher, I am the actual data collection instrument (Patton, 2002). I will employ the following data collection techniques: interviews, observation, collection of artifacts and follow up interviews with administrators and teachers.

Significance of the Study

The use of mobile devices as an instructional strategy has increased rapidly over the last five years in the educational arena (Prensky, 2013). This increase has placed additional burdens on districts to provide training, wireless infrastructure and support staff to adequately implement mobile devices (Gentile, 2012). Broader implementation of mobile devices in the middle level classroom has grown to a level where further study is needed to understand teacher and administrator perceptions of the impact of this type of innovation on instructional resources and strategies. A mobile device's impact on the middle level classroom must be discovered and vetted by site administrators and classroom teachers to understand its potential benefit for students (Tagsold, 2012).

Technology has evolved and continues to evolve quickly, and devices and systems change and are updated frequently (McLester, 2012). Administrators and teachers are faced with multiple second-order change initiatives, changes that involve a fundamental difference

in traditional teaching practices, such as new evaluation tools, the implementation of new state standards, and the increased infusion of technology into the classroom. Research in this area will lead to insight concerning improved user access and interface, the ability for administrators and teachers to single out or filter the highest yield strategies for implementation of mobile devices and their use in the middle level classroom (Kukulska-Hulme, 2013). For research, this study will provide foundational understanding for further study on teacher and principal perceptions of challenges and opportunities created by the integration of mobile devices in middle schools. The application of Diffusion of Innovation as the theoretical framework in this study expands the use of this theory to explain the integration of technology, specifically mobile devices, in these selected middle schools.

Assumptions

The underlying assumption for this study is that site principals utilizing mobile devices manage change as educational leaders whether they view it as managing change or not. They might not acknowledge their roles as change agents. It is also assumed that all of the principals use mobile devices daily and with a basic knowledge of the user interface.

Definition of Terms

Mobile Devices - a portable, wireless computing device that is small enough to be used while held in the hand; hand-held, to include Tablets and Smart Phones (Oxford University Press, 2018).

Instructional Leader – for the study this term will be utilized to designate site or district administrators. Public school leaders are more than just responsible for managing people as in traditional management, they are responsible for the instructional levels

at their sites or districts and have a direct impact on the culture and success of their

respective areas (Whitaker, 2012).

Second Order Change – the National Academy of Sciences, Engineering, and Medicine

(2013) defines as "deciding – or being forced

 – to do something significantly or fundamentally different from what we have done

before" (lines 14-17).

First Order Change – is defined as working with existing systems and restoring balance

(Thornsborne & Blood, 2013).

Teacher Leader Effectiveness (TLE) – Oklahoma Senate Bill 2033 enacted the TLE

evaluation system. The centerpiece of the bill is a revamp of the current teacher

evaluations system; 30% is based on student academic growth; 15% based on other

academic measures; 50% rigorous and fail qualitative components.

Middle-Level – Refers to grades six through eight in public K-12 education.

Innovation – is defined as a new method, product, idea, etc. (Oxford University Press, 2018).

Diffusion – is defined as the process by which innovation is communicated through certain

channels over time among the members of a social system (Rogers, 1995, p. 5).

Summary and Organization of the Study

The research report is organized into five chapters. Chapter I gives background

information on the change initiatives currently faced by the participants, the development and

use of mobile devices and a brief history of Rodger's Diffusion of Innovations (1995). The

overview of the theoretical framework gives rationale for choosing these specific frameworks

and the relevance to the problems and purpose of the research study. Additionally, the

discussion on the significance of the study presents its significance to research, theory and practice. The chapter ends with assumptions and a list of terms defined.

Chapter II is a review of the literature as it relates to the problem statement. History of educational technology, mobile devices, and technology's impact on change are presented and discussed.

Chapter III provides a description of the methodology, to include descriptions of participants, research design and the procedures used to conduct the study.

Chapter IV reviews the results of the study, to include data gathered, and observations.

Chapter V presents the findings of the study, summarizes the conclusions and reinforces the significance of the study.

CHAPTER II

LITERATURE REVIEW

Twenty first century skills are a current focus of American education. Twenty-first century teachers and administrators are trained to identify specific student needs and respond to those needs as their roles dictate (Gnedko, 2013). An emphasis on self-directed learning, STEM skills, and working in collaborative and active learning environments is becoming increasingly more prevalent to meet individual student needs. Mobile devices are being implemented in an attempt to meet the individual needs of students in many public schools (Pearson, 2015).

Frequent and sweeping changes to American public education to meet 21st century skill needs has created significant challenges for teachers and administrators. Necessary time for training and implementation of mobile devices to meet the needs of students is difficult to find and sustain (Technology-Rich Learning, 2013). As mobile technology has become more prevalent in the educational setting, technological advances have streamlined the ability to implement and monitor mobile devices in the middle-level learning environment. The necessity to implement 21st century skills into the middle-level classroom is driving the implementation of mobile devices.The following literature review will first address the emergence of technology in the classroom. The review of literature with further describe the effectiveness of implementing mobile devices as an

instructional strategy. Finally, the review will end with speculation regarding why various challenges impact mobile device implementation in the middle-level. The Chapter concludes with an explanation of the theoretical framework proposed for this study, and a connection between the use of this framework and the integration of mobile devices is included.

The Emergence of Electronic Technology Use in the Educational Setting

The landscape of current instructional practices is highly researched and constantly evolving as new technological ideas are brought forth (Marzano, 2008). To understand the present state of educational technology, the process in which it has evolved and developed is vital. Education began with communities sharing information to the next generation to perpetuate cultural norms. As cultures individually developed and became more complex, so did their ways of communicating and instructing the next generation. Through the centuries, from writing and drawing on the walls of caves to the beginning of settlements and cities, educational practices have gone through many shifts, and these have each led to new technologies impacting instruction (Spector, 2010).

One of the most significant impacts of innovation on instruction was the invention of the printing press. With the printing press, books no longer had to be created through time intensive processes, but, instead, they could be printed in mass quantities and at a much reduced cost. This innovation allowed for the collection of knowledge and the transmission of that knowledge to expand at an unprecedented scale (Saettler, 2004).

Through the creation of the printing press, a reformation of the entire educational system in Europe began through priest John Amos Comenius. Comenius saw education as the tool that could reform human society (Sadler, 2013). With no current standard for instructing children, Comenius wrote two books on the way that students learned. His titles include, *The Great Didactic* and *The School of Infancy* to inform those responsible to teaching of the importance of making instruction quicker, enjoyable to the student and complete (Sadler, 2013).

Comenius' work was received well and became the standard practice in large portions of Europe with both of his works translated into multiple languages. Comenius is considered one of the fathers of our current programed instructional practices (Saettler, 2004). Others such as Froebel, Locke, and Rousseau developed and refined further processes based on the relationship between human development and learning, thus creating educational theory (Saettler, 2004). The furthering of education theory from the aforementioned researchers, started a discussion about physical development's impact on cognitive function and methods to adapt pedagogical practices to match those developments (Spector, 2010). Each new idea and reformation led to new methods and tools for instructing students. Much of Comenius and others' work was driven by the desire to improve instructional practices and ensure that learning was less complex, rapid, and cost-effective (Wood, 1992). In this period of history, educational technology came with the understanding that educational technology is not a product, but rather a process that impacts instruction (Saettler, 2004).

Schools in the late 19th century were primarily based in rural communities, and the majority used ink wells and quill pens for students and chalkboards as the main

medium to present information to students (Molenda, 2008). The limited technological integration in the instructional practices is reflected in the educational theory of the time due to the nature of rural access to resources versus urban areas, and adaptation and implementation are often not possible. Instructional theory at the time was based in the industrial revolution and ensuring workers were capable of completing tasks in a factory setting (Molenda, 2008). The value of formal education came secondary to the ability to support a family in agricultural endeavors (Molenda, 2008). Technological advances were expanding rapidly with the industrial revolution, and the focus was on aligning un-skilled worker efficiency through instructional efficiency. The culture in American business began to place demands on the educational system of the time to create workers that could fit into the current industrial complex (H. Jacobs, 2010).

In American Education, major advances in educational technology took place in the 20th century. In the early 1900s, photography and image technology were developing rapidly, and the educational practices of the time can be grouped into a "progressive" education label with visual educational practice being implemented (Wiatr, 2003). The visual pedagogical practice was designed to implement visual materials focused around photography, specifically stereographs, motion pictures and lantern slides into the educational setting (Orgeron, Orgeron, & Streible, 2012). The visual instructional methods sought to Americanize and modernize students while teaching them to analyze images in context and seek out an objective view of the information presented (Wiatr, 2003). The impact of this movement led to an increase in documentary creation in the early 1930s, and motion picture technology developed (Ellis & McLane, 2005).

During the early 1920s, radios became commercially available and accessible to the middle-class American (Kahn, 1984). Unlike the visual movement taking place, radios allowed for immediate information transfer. The radio was able to broadcast immediately and gave the listener a sense of being present in the broadcast location. The radio allowed for an increase in rural learning opportunities. Initially, the majority of early educational broadcasts were simply an auditory version of the lesson that would take place in a classroom, and they were designed with one community or one type of learner in mind. The educational impact was limited initially due to the lack of community need/relevance (Imhoof, 1983).

Television's impact on educational practices and learning have been significant (Piotrowski, 2014). However, educational leaders had mixed perceptions concerning how television would influence educational outcomes. For example, Dr. Daniel L. Marsh (1950), at the time President of Boston University, said, "if the [television] craze continues with the present level of programs, we are destined for a nation of morons" (p. 54). In 1954, the creation of education television sought to use the medium for learning. In 1970, the Public Broadcasting Service (PBS) was created from the initial National Educational Television non-profit created in the mid-1950s to create and broadcast educational programs (Piotrowski, 2014).

Educational television programming ranged from foreign language instruction to lessons on advanced physics initially (Piotrowski, 2014), but it has since evolved into more programming focused around music and news. Research is divided over the impact of television on education. Research has shown that the implementation of television causes learners to become passive and has led to a decreased student interest in reading

(Alloway, Williams, Jones, & Cochrane, 2014). In contrast, the impact on young learners has been positively observed through television programs such as *Mr. Roger's Neighborhood* and *Sesame Street* that are focused on early reading skills and social interaction skills (Alloway, Williams, Jones, & Cochrane, 2014). Much as in the visual educational practices, television programing also led to students experiencing learning that would otherwise have been unavailable or logistically improbable, e.g. viewing other countries/cultures, watching science experiments or demonstrations such as the Apollo mission launches and interviews of experts in various areas of industry or research.

In the mid-1940s, the first computers used for education were introduced. The initial two main computers used were at the university setting: the MARK 1 at Harvard University and ENIAC at the University of Pennsylvania (Levien, 1972). The main uses for computers early on were generally isolated to science, engineering and mathematics, and they were used for real-world problem solving that replaced the slide-rule and the abacas. The first main stream use of computers in education allowing all students access was at the University of Illinois and was called PLATO. It was a terminal system and was created by David Bitier to serve undergraduate students, primary school reading, a community college in Urbana, and multiple campuses in Chicago in 1959 (Molnar A. R., 1990).

Looking to expand the use of computers and allow increased student access, two significant systems were created by researchers at Dartmouth University: Kemeny and Kurtz. They created time-sharing and the computer language BASIC. In the early 1960s, student requests for computer use were batched together through punch cards, and the time for processing was significant (Kemeny & Kurtz, 1968). Kemeny and Kurtz created

a system that shared computer access allowing students to directly interact with the computer versus waiting in a que of other batched requests. Their approach expanded this system to allow for other universities to access it at the same time. Computers in the late 1950s and early 1960s used a machine language called FORTRAN that was complex and was difficult to work with and manipulate. Kemeny's and Kurtz's computer language BASIC became the primary language used to create computer-based instructional materials and for the first time, it allowed for access at all levels of education (Molnar, 1990).

With the rapid development of computer languages and access, university researchers began to seek ways to use computers to individualize student learning (Molnar, 1990). In the early 1960s at Stanford University, Patrick Suppes and Richard Atkinson created learning programs that provided quick feedback and allowed for students to correct their work using a drill and practice method. Using this method, students were able to learn at their own pace (Levien, 1972). With the rapid development of computer aided instruction, the National Science Foundation funded an expansion of computer network resources allowing over 300 universities and some secondary public schools access. By the early 1970s, over 55% of schools in the country had access to computer aided instruction, and 23% were using computers as the main instructional tool (Molnar, 1975).

In the 1970s, computers transitioned from large, high-cost systems that were shared between multiple schools, to affordable microcomputers (Levien, 1972). With the creation of microcomputers, computer use spread rapidly, and by the end of the 1970s, having a computer became as important in education as having books (Levien, 1972). As

computers became accessible to all levels of learning institutions, their development and uses expanded through the 1980s and early 1990s. As expansion occurred, the desire for increased connectivity through technology also pressed advancement (Prensky, 2001).

The 1980s saw the creation of the internet. Starting in the 1950s with computer development, the possibility of computer networks was conceived. In the 1960s, the Department of Defense awarded contracts to create computer networks that led to the development of Advanced Research Projects Agency Network or ARPANET with the first message sent over that network in 1969 (Levien, 1972). As computer networking grew, new standardized protocols were created that led to ease of communication, and with government funding, the ARPANET network access was expanded. The first commercial internet service providers (ISPs) emerged in the 1980s along with the world wide web created by researchers at the European Organization for Nuclear Research Academic and Science or CERN in Switzerland (Molnar, 1990).

The world wide web provided the structure for the creation of multiple forms of electronic communication and interaction (Alvarezi, 2010). Electronic mail (email), two-way video and text messaging, social media, discussion forums and increased network speeds have created a vast amount of information and resources that are accessible to schools and are leading to a change in the skills sought from education toward 21st century demands (Rivero, 2012). As students have access to exponentially more information and collected knowledge, the ability to sort through and categorize information is vital. Teachers are adapting their pedagogical practices in an effort to facilitate learning and discovery versus being the center of learning and knowledge (Jacobs, 2010).

Using Technology to Develop 21st Century Skills

As digital resources become pervasive in the classroom, they are driving changes regarding the instructional practices taking place (Prensky, 2001) in schools. As students are exposed to technology and digital learning from birth, they need critical thinking and inquiry skills to identify information and resources for problem solving (Padilla, 2010; & Trilling & Fadel, 2009). Twenty first century skills also require students to communicate and collaborate to complete tasks and master content. As 21st century skills become more prevelant, teachers are changing their classroom practices from "tell and explain" to "ask and challenge" to adapt and meet the needs of their students (Becker, 2011).

McCaffery (2011) suggests that the use of mobile technology opens the door to making student learning personal and motivating while also helping secure students' future in the new economy of the 21st century. This new economy is based on knowledge. As technology becomes a permanent tool in the classroom, it is no longer just a tool for learning, but a foundational piece of gathering and assessing information (Prensky, 2013). Prensky (2013) also suggests that technology is the key to thinking about and knowing the world around us. Humans have relied on peripheral mind augmentations such as writing and drawing to help process learning. Technology has become an extension of our brains, and as Drs. Clark and Chalmers (1998) write, "extended cognition is a core cognitive process, not an add-on extra." For instance, if a student uses technology to collect notes in lieu of utilizing their memory to recall information relating to the task they are attemping, the student is using the computer to extend their cognition. Clark and Chalmers also write that the brain is consistently using peripheral items to assist with learning tasks. For example, a student with a learning disability impacting

information retention may write down his/her schedule for the day and locker combination in a mobile device notes application to serve as their memory. Another student not having any disabilities can recall that information from memory. Clark and Chalmers found that the only differnce between the two students is that student one's memory is served by a notes application while student two's memory is being served internally (Clark & Chalmers, 1998).

Successes of Technology Integration

Beginning in the 1980s, research regarding computer aided learning systems have shown that with student individualization, instructional training, and resources, students often experience significant growth versus traditional methods (Padilla, 2010). Brown (2009) studied the implementation and effect of an intelligent tutoring system for students on mobile devices versus desktop computing. The study found that mobile device use had lower overall cost due to the size of the device, and the software utilized was more portable and could easily be moved to meet the needs of students (Q. Brown, 2009).

The Friday Institute (2009) released a white paper on students' need to access mobile devices in the classroom to re-create contemporary work environments. Initially use of mobile devices was identified as an alternative pedagogical method, according to the William and Ida Friday Institute for Educational Innovation (2009), teachers become facilitators of learning through inquiry-based strategies through access to mobile devices. The report stated when mobile devices are used in conjunction with teaching practices based on John Dewey's theory of productive inquiry, students' level of content mastery increases. Findings from this study suggest that instructional technology can be

effectively used to raise student engagement, provide greater depth of knowledge, and enhance depth of instruction in the classroom (Bonk, 2009).

Although mobile devices present challenges (as discussed later in this chapter) as well as potential benefits, Allen (2001) presents education experts with reasons for using them in the classroom. Allen (2001) suggests that these powerful small computers motivate students, provide constant access to the wealth of knowledge, tools, and experts on the web, and are cheaper and more plentiful than laptops or desktop workstations (Allen, 2011). In a similar study, James Heiden (2012) explored the lived experiences of five urban and suburban teachers in the metro-Milwaukee area who routinely connected with kids 24/7 through cell phone use for educational purposes. The purpose of the study was to examine what the impact of this phenomenon has on the teachers. The significance of this study is the positive experiences of teachers who use technology to teach students when and where the students are ready to learn. The study showed a positive correlation between increased student mastery and access to their teachers through mobile devices (Heiden, 2012). Similarly, Akyeampong (2009) found that a teacher preparation program's training on the pedagogical practices involved in implementing the use of technology when instructing students has a direct bearing on the overall performance of teachers as they enter the field of education. Teacher education programs are challenged to prepare graduates who are capable and committed to using technology as a tool to enhance learning in all of their students (Davidson & Goldberg, 2009).

With increased access to mobile technology and the information available through its use, educational systems have struggled to keep pace with that impact on the social

development of young people (Pachler, 2010). The educational system has a need to develop a new model that makes learning personal, motivating, and helps secure students' future in the knowledge economy. McCaffery (2011) showed that mobile technology is a high-yield approach to making learning relevant and personal to students while providing necessary supports to mastery.

In a study comparing ninth grade student learning of vocabulary through software on cell phones versus traditional methods, students using mobile devices showed increased motivation and increased vocabulary comprehension (Brown, 2008). Findings from Brown's (2008) study indicate that students using mobile devices, in this case cell phones, responded positively due to the motivation using the cell phones provided. Research has also shown that when school sites and districts work to develop implementation strategies for mobile devices, focusing on instructional training and administrative support, these efforts correlate to positive student growth and higher levels of student interest and motivation (Adams & Angeles, 2008). In Brown's (2008) study, students using mobile devices to access frontloading vocabulary techniques increased their vocabulary comprehension versus peers not using devices.

As schools frequently focus on 21st century pedagogical practices and methods to individualize student learning, educators must understand how to implement the use of mobile devices in the classroom. Findings suggest that there is a positive correlation between a well-designed implementation plan that includes teacher and student training and student growth (Banister, 2010). Students learning in the 21st century need access to technology as individual content knowledge becomes secondary to the ability to collaborate, solve problems and navigate/assess content (Weisblat & McClellen, 2017).

Students with access to technology are able to access a more diverse body of information and work collaboratively to meet the career needs of the 21st century learner (Weisblat & McClellen, 2017). As districts are adjusting to a collaborative, problem-based form of learning, previous methods are being successfully blended with digital resources to support student mastery of content learning goals and transform teachers into facilitators versus gatekeepers of knowledge (Swallow, 2015). For example, in past pedagogical practices, teachers were perceived as the "keepers of knowledge" and students had one primary avenue available to access knowledge: the teacher. With the implementation of technology, the teacher transitions more to the role of a facilitator, helping students access available knowledge, sort gathered information, and use critical thinking skills to solve problems presented (Hur & Oh, 2012).

Studies support the correlation between the use of mobile devices and student achievement. In a 2012 study, students were provided with mobile devices that had unlimited data plans and were given free use of the device (Squire & Dikkers, 2012). Squire and Dikkers (2012) found that students' opportunities for learning increased with access and that the students used the mobile device to improve their family's knowledge, creating teachable moments at home. The individualization of instruction and the opportunity for students to self-pace learning was increased through the use of a mobile device (Weisblat & McClellen, 2017). In studies by Tagsold (2012) and Harris (2012), allowing students access to a mobile device through a 1:1 or a bring-your-own-device (BYOD) initiative produced increased content mastery in an unexpected manner. Students began to use mobile devices outside of the structured times allowed through the classroom setting, which created additional learning opportunities and unintentionally

increased student collaboration and learning (Harris, 2012). Tapping students' interest in these digital tools to design more rigorous and motivating assignments means that student achievement would increase (Jacobs, 2010). In sum, seated in just the first few years of a new millennium, educational institutions and training organizations are being forced to modify or significantly change the instructional practices that they have used and historically found to be highly effective (Bonk, 2009).

Challenges to Mobile Device Implementation

As many schools implement 1:1 initiatives by providing mobile devices to students, lack of thorough planning has negatively impacted students and teachers (Hart, 2012). In his study of teacher perceptions of using technology as a learning tool, Davidson (2013) found that teachers felt they were not provided with adequate pedagogical training on how to use the devices, nor were they allowed much needed time to practice with the new tools. In Briggs' (2006) study, a number of districts' initial implementation provided thorough training on device use and instructional practices to teachers, but they lacked a plan to sustain teacher knowledge and technology support, causing the initiative to struggle and in some cases, fail (Briggs, 2006).

Teacher self-efficacy and experience also have an impact on the implementation of mobile devices (Mishne, 2012). Teachers that had high self-efficacy toward technology were more likely to be early adopters, but those were a small percentage of the population studies, often less than five percent (Davidson, 2013). One-to-one initiatives frequently meant the implementation of technology that teachers were not familiar with and that lacked a content management system. These efforts wasted

resources as devices were under-utilized or not implemented (Doe, 2006). A majority of teachers that volunteered for a 1:1 implementation considered themselves as technology proficient and were in their first three years of teaching. When their state assessment scores were compared to teachers with five to 20 years of experience using traditional, non-digital methods, the latter showed higher gains (Conrad, 2008). However, a lack of training for administrators often contributed to failure of 1:1 initiatives due to the inability of the administrator to provide support (Alvarezi, 2010).

Branham (2012) found that the implementation process was often rushed and that teacher training was not a focus of the implementation plan. Additionally, site administrators' lack of exposure to devices and training led to an implementation suffering and producing poor results due to a lack of perceived importance. Administrators at the building level were frequently not included in logistical decisions leading to a lack of resources available at the site level (Schachter, 2009). When districts implement new mobile devices without consulting site leaders, the resources available at the site to maintain devices is not taken into consideration frequently leading to a negative impact on the success of the project (Hur & Oh, 2012).

During the first year of technology implementation plans, results are frequently positive, yet studies that continue over a multi-year period tend to result in contrasting results (Swallow, 2015). In her study of a middle school 1:1 implementation, Swallow (2015) found that following the first year of implementation, there was a "cliff" in terms of success and perception. Teachers struggled as the network failed to work, and devices were slow to boot. Students perceived the use of technology as having a negative impact on their learning due to difficulties using the devices and teachers' inability to effectively

use of the devices leading to students' perception that the technology was not useful (Swallow, 2015). Teachers began to discuss practices and systems prior to the implementation, and the result was a "glorification of the old way" (Jellison, 2006, p. 16) of instructional pedagogy. Even though they were perceived as positives for a school district on the outset, the implementation of technology can end up as negatives as the project progresses (Prensky, 2001). Schools are inundated with curriculum initiatives, state mandates, and technology infusion programs designed to improve instruction and promote student academic success (Phin, 2010). These mandates are hard to achieve without the proper technological support and hardware. When a district or school site makes the decision to invest in technology, educational leaders must first research the cost effectiveness and reliability of the program. Software may not produce the desired results, and the district could lose valuable money and instructional time (Rivero, 2012) if technology use is not implemented properly.

A lack of device management causes loss of instructional time and increased disciplinary referrals when devices are first introduced (Gentile, 2012). For example, student mobile device use in the classroom negatively impacts instruction due to multiple distractions provided (Gibbs, 2011). Garner (2008) found that full immersion of technology did not result in a statisically significant impact on the Texas Assessment of Knowledge and Skills (TAKS). His research found that only providing students with devices in a 1:1 implementation did not impact student academic growth in literacy and mathematic skills (Garner, 2008). Similarly, in a 2004 study, Hu followed 42 Texas middle schools. Of these schools, 21 schools utilized 1:1 mobile devices, and 21 schools that did not. Hu (2007) found no overall difference in student achievement scores

between the different school sites. Similar studies in California and New York also failed to show any statistically significant differences following the implementation of mobile devices, and those implementations were abandond (Hu, 2007).

Studies also show that students frequently misuse devices, accessing pronography, cheating, hacking school and local business networks, and accessing social media in lieu of participating in academic tasks (Tagsold, 2012). The Technology-Rich Learning Institute (2013) refered to student mobile device access as a "genie on the loose," where educators were unable to monitor the growth and use of stuent technology use in the classroom. A recent article on integrating technology in the classroom suggests that increased screen time during the school day is rewiring student brain pathways and negatively impacting peer interaction (Edmund J. Gleazer School of Education , 2016). Prensky (2013) supports the idea of our brain being rewired to adapt to the amount of screen time students experience. For example, student interaction with technology can lead to an increase in adrenilin due to the stimulation a device provides leading to physical and cognitive adaptation by the body. Additionally, research has shown that differing areas of the brain are accessed and utilized when using paper and pencil versus digital resources (Rosen, 2011). When there is frequent access to technology, the brain releases adrenilin which in the onset increases response time, but over time deteriaties attention and response time (Prensky, 2013).

These negative consequences of the use of technology can have important implications for students. In a recent educational leadership article, Medina (2008) referred to the current generation of students as both the net generation and digital natives. Students are constantly inundated with new stimuli. Sprenger (2009) wrote

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"excessive connectedness can cause stress, which results in the release of cortisol and adrenaline from the adrenal glands" (p.39). These stress factors cause student memory to initially operate at a higher level, but after prolonged chemical releases, a student will see weakened cognitive functioning (Carr, 2011).

Impact of Expense on Mobile Device Implementation

Demographics have an impact on the success or failure of a 1:1 implementation (Holcomb, 2009). Hudson (2011) discussed the "digital divide" that takes place between schools. Today, there is a gap in the quality of education between the wealthy and the poor of America (Gonzales, 2012). This socio-economic gap is at the heart of public education in America today. Schools from affluent districts are able to integrate technology in a far accelerated method due to the social-economic status (SES) of their students (Warschauer, 2006). Students from high socio-economic areas typically had increased access to mobile devices and were prone to show high academic progress versus students from low SES areas (Gonzales, 2012). Warschauer (2006) found a strong correlation in the success of a 1:1 implementation between students from affluent areas. Those students are more frequently encouraged to attend college from a younger age, where students from low SES backgrounds are often not encouraged to attend college at all.

A differing factor in the success or failure of a 1:1 implementation was based on the funding for the total cost of ownership (McIntire, 2006). Challenges to the implementation of mobile devices in a 1:1 project leading to failure frequently begin with the lack of short and long-term bond fund planning leading to lack of financial resources. Inequalities exist in ability to purchase the devices themselves and the ability to sustain

successful implementation. Districts are failing to prepare for the increase in bandwidth and infrastructure needs, yet the largest impact is the lack of an education vision that has clear expectations and end goals (Harold, 2016). Districts with accurate estimates of the total cost of ownership in place prior to implementation were able to support the burden of device and implementation costs throughout a multi-year 1:1 plan (Coen & Nicol, 2007). Budget restraints in Vermont caused implementation plans to struggle and have a negative impact on the middle school students using the devices. Student damage to devices, the lack of hardware support and lack of adequate training due to budget restrictions had a negative impact on academic performance (Downes & Bishop, 2015). Matoaca High School in Virginia reduced investment in their laptop implementation in 2006 due to poor academic performance and the costs of the implementation exceeding initial estimates (Hu, 2007). Had Matoaca continued to support the project, it was going to cost over $1.2 billion to fully implement. Everett A. Rea Elementary School in Costa Mesa, CA, dropped their implementation plan when the 30 devices provided to teachers were not being implemented into classroom instruction and learning (Hu, 2007).

Preparing for Mobile Devices

Schools see success in mobile device implementation when they have a complete plan that accounts for teacher, student and administrative training, device management, continuous infrastructure upgrades, as well as support personnel (McLester, 2012). Districts have begun to collaborate to ensure successful implementation plans for mobile devices (Greaves, Wilson, Gielniak, & Peterson, 2010). For example, as resources are limited, districts with similar needs and demographics are working together to create implementation plans and educational visions that are similar to share the load of placing

devices in classrooms (Greaves, Wilson, Gielniak, & Peterson, 2010). When teaching outcomes and instructional practices are the core of a project, higher academic growth is achieved and sufficient teacher training results (Kukulska-Hulme, 2013).

Failure to achieve a successful 1:1 project, resulting in decreased student academic performance, is often tied to holding unrealistic expectations and the method and model of implementation being unclear in the onset (Rivero, 2012). In 2009, St. Louis School District implemented a virtual education program for students to meet education requirements through online learning (Anane-Boakye, 2016). After two years, the funding levels from the federal government decreased and funding in the state dropped forcing the district to drop the program. This deletion caused many students' education plans to be disrupted and caused them to lose credits (Anane-Boakye, 2016). Failure in a Liverpool, NY project was due to a poor model of implementation. Utilizing a concentrated model of implementation allows students to each have and take home a device providing them constant access to content (Rockman, 2000). Eighty percent of students participating in a concentrated implementation model reported higher levels of productivity (Silvernail & Gritter, 2008). Branham (2012) suggests that mobile device implementation is a process and not a singular event.

Educator Training and Support

Most educators remain unaware of the enormous number of nontraditional learning venues and opportunities afforded by mobile devices, or they are hesitant to use them when they are available (Becker, 2011). Not surprisingly, the field of education is replete with highly thoughtful, yet cynical articles about how little technology has improved the state of education (Barrett-Greenly, 2012). Teacher preparation programs

that incorporate teacher training to use technology when instructing students has a direct bearing on the overall effectiveness of teacher preparation programs (Akyeampong, 2009). Consequently, teacher education programs are challenged to prepare graduates who are capable and committed to using technology as a tool to enhance learning for all of their students (Davidson & Goldberg, 2009).

As schools are pressed to utilize technology in classrooms, funding becomes an issue for some (Anane-Boakye, 2016). However, school districts are finding other ways to integrate technology regardless of the amount of funding they have or lack. For example, teachers are using free online resources and Web 2.0 to facilitate higher levels of student achievement and engagement through technology use (Van Der Kaay, 2010).

Schools are already inundated with curriculum initiatives, state mandates, and technology infusion programs designed to improve instruction and promote student academic success (Phin, 2010). These mandates are hard to achieve without the proper technological support and hardware. To adapt to these changes and best serve their student populations, districts in Virginia are using wireless technology and accessing social media sites providing staff a way to communicate virtually anywhere in the building to create or even reflect on current lessons (Shane, 2012). This method has created an open school environment where information flows freely allowing for strong student collaboration (Rother, 2005). Districts are also providing sustained learning opportunities for teachers through the use of additional staff known as technology facilitators (TF). Teachers from sites with a TF showed a higher level of implementation and higher student academic performance (Stanhope & Corn, 2013) than those that did not emphasize the implementation process. Teachers and administrators that are provided

with continual training on 21st century skills, basic hardware maintenance and device use

show statistically significant improvement in student assessments (Coen & Nicol, 2007).

Middle Level Learning

Studies on the impact of technology implementation have been relatively sparse

for middle school aged students, although some research has shown that there is a

positive correlation between supporting middle level instructional practices and high

school dropout rates declining (Balfranz, Herzog, & Maclever, 2007). Middle school

philosophy was born after a presentation by Dr. William Alexander in 1963 was given at

a Cornell University conference on the junior high school model (Association for Middle

Level Education, 2010). The philosophical change was focused on ensuring curriculum

and the pedagogical practices were aligned to adolescent development of students ages 10

to 15 (Association for Middle Level Education, 2010). Alexander (1963) said the

following to his school district in reference to the middle school philosophy:

> Intellectual growth means much more than an increasing competence in the
>
> academic content of curriculum. We must endeavor to stimulate in the child a
>
> love for learning, an attitude of inquiry, a passion for truth and beauty, and a
>
> questioning mind. The learning of right answers is not enough… beyond answers
>
> alone, we must help children ask the right questions, and discover their answers
>
> through creative thinking, reasoning, judging, and understanding. (pp. 3-4)

Students ages 10 to 15 experience swift physical and emotional changes that,

unlike infant development where there is not a cognitive understanding of changes taking

place, middle school students are keenly aware of the changes (Association for Middle

Level Education, 2010). In light of these physical and emotional changes, and in response to Alexander's initial challenge, the Association for Middle Level Education (AMLE) has further defined middle schools to be developmentally responsive, challenging, empowering and equitable (Association for Middle Level Education, 2010).

Middle level student learning varies in that students are able to think both concretely and abstractly (Association for Middle Level Education, 2010). Scales and Leffert (2004) found that middle level students:

Prefer active over passive learning experiences: depending on their cultural backgrounds, some young adolescents may be quite engaged in learning through observation but might not always show this engagement through the active participation that is typically desired and rewarded by teachers. (p. 77)

Middle level students are extremely curious about a varying range of cognitive interests that are often short lived (Scales & Leffert, 2004). Learning and interests are often tied to peer relationships which research has shown need adult role models to guide and provide feedback helping young adolescents affirm their actions and beliefs (Association for Middle Level Education, 2010).

With the developmental changes of adolescents impacting student learning so heavily, studying how technology impacts that development is vital (Hsieh, Cho, Liu, & Schallert, 2008). As technology implementation in schools is developing and changing to meet student needs and promote best practice, understanding the interplay between developmental impacts, cognitive development and chosen technology tools is critical to academic success (Hur & Oh, 2012).

Theoretical Framework: Diffusion of Innovation

Rogers (1995) states implementing new technology has a relative advantage due to the perception that the new technological idea is superior to the previous norm. The level of influence that relative advantage has on adoption is based on perceived convenience, social factors and satisfaction with the innovation. This relative advantage is truly relative as is relies on the user's perception rather than objective reasoning. According to Rogers, (1995), the greater the user's perception of advantage, the more rapid the innovation will be adopted (Rogers, 1995).

Rogers' diffusion of innovation includes four key factors that promote diffusion: the social system, communication, time and the innovation itself (Rogers, 1995). Within a social system there are three factors that impact innovation adoption: compatibility, complexity and trialability (Rogers, 1995). Compatibility explains how the innovation fits within the existing systems that are in place. An innovation that does not align with current practice, beliefs and past experiences will cause the adoption to be a slow process that will require a new value system to replace the existing system; where as, an innovation that is aligned with current norms and values is likely to have quick adoption. As an example, implementing mobile devices and using a learning management system that replaces large portions of classroom instruction when the existing system is built on strong classroom instruction would not be compatible. Therefore, the adoption of this innovation would be slow. Complexity is the degree to which the innovation is viewed as difficult to utilize or understand. If the innovation is one that builds on prior knowledge or is simple to understand, the user will move toward adoption quickly. Trialability is the degree to which the user is able to experiment with the innovation, such as a pilot

program. If the innovation is divided into sections that allow for trials within each section, the innovation is likely to be adopted much more quickly versus those that are not separable. Observability is the degree to which the innovation's results are visible to others. If users see the success of the innovation and are able to discuss those successes with peers, they are more likely to adopt an innovation more quickly (Rogers, 1995).

Communication within the innovation process occurs when users share experiences, positive and negative, and information with each other in order to gain a shared understanding. Communication that reaches large portions of the population of users is an effective way to communicate innovations, whereas interpersonal communication helps to foster new beliefs and attitudes towards an innovation. Communication is very important as most users do not base their decision to adopt an innovation on scientific research, but rather, through subjective observations by other users who have adopted the innovation (Rogers, 1995).

The dimension of time is the next section of the DOI process, and it influences the innovation adoption in three ways (Rogers, 1995). The first way that time is involved is the innovation- decision process. This is the process in which the user evaluates and processes information about the innovation. The user begins with general knowledge of the innovation. This general knowledge moves into an attitude about the innovation, and then the user seeks a confirmation of his/her attitude of the innovation (Rogers, 1995). During the innovation-decision process, the user passes through five steps; 1) knowledge, in which the user gains basic understanding of the innovation and how it functions; 2) persuasion, where the user formulates an attitude, positive or negative, about the innovation; 3) decision where the user now engages in activities that wither support or

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reject the innovation; 4) implementation where the user uses the innovation; and lastly; 5)

confirmation where the user assesses the results of the innovation-decision he/she has

made (Rogers, 1995).

The second way that time influences the diffusion process is through the

innovation of the user or group as a whole. Through innovation, users reveal their desire

to be an early adopter in relation to the other members of a social system (Rogers, 1995).

Rogers (1995) divides the users of an innovation into five classifications by typical

percentages of the population: innovators 2.5%, early adopters 13.5%, early majority

34%, late majority 34%, and laggards 16%. This explanation follows a typical bell curve

where 64% of the population lies within one standard deviation from the mean (Rogers,

1995). Figure 1 represents the distribution of innovation across typical populations. The

third way in which time influences the diffusion process is through the rate of adoption.

The rate of adoption is related to the pace in which an innovation is adopted by users in a

social system. This rate is measured through the adoption of the innovation. during a set

period of time (Rogers, 1995).
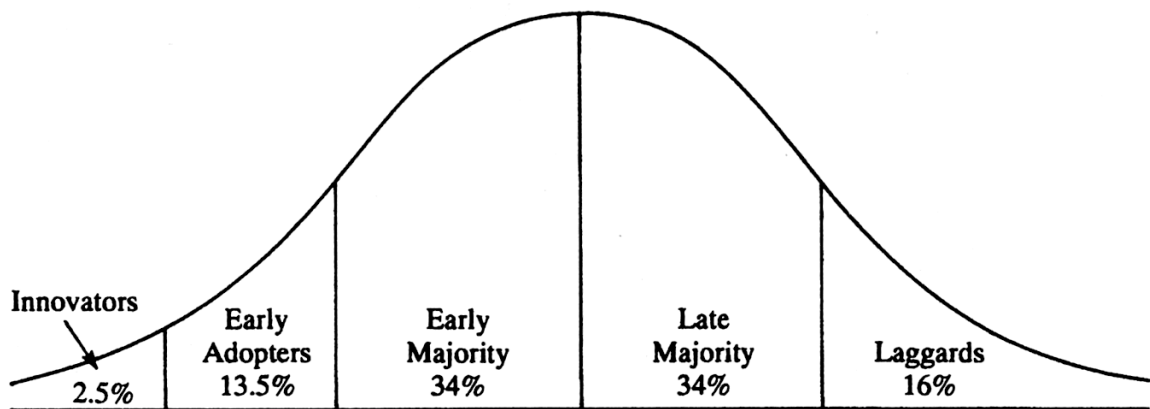
Figure 1. Adopter Categorization on the Basis of Innovativeness. (Rogers, 1995, p. 281).

The fourth part of the DOI framework is the social system. Rogers (1995) defined a social system as "a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal" (Rogers, 1995, p. 23). Members of a social system can be individuals, groups or institutions or any sub-set within a group or institution. A social system acts as a limit wherein the innovation is diffused. Norms within the social system have an impact on the adoption rate of an innovation. Individual users' ability to influence others within the social system also plays a role in changing or forming positive and negative attitudes toward the innovation. The last portion of the social system that influences the diffusion of an innovation occurs when a system reaches critical mass (Figure 2).
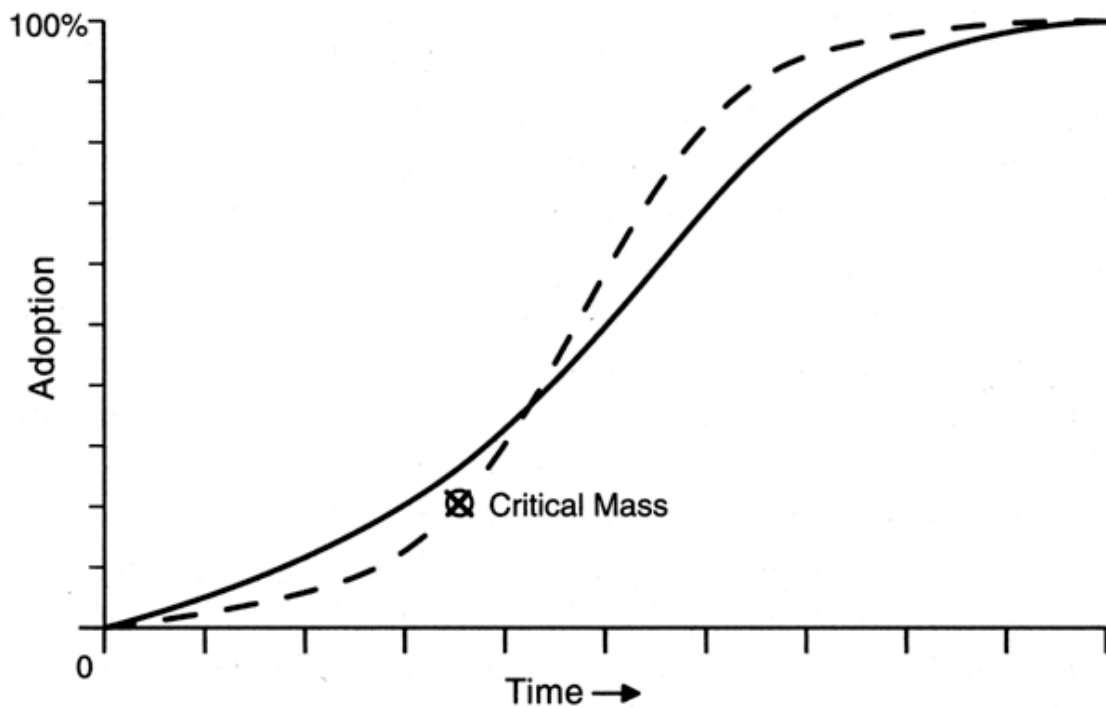
Figure 2. The Rate of Adoption for an Interactive Innovation, Showing the Critical Mass. (Rogers, 1995, p. 344).

Critical mass occurs when enough of the population have adopted the innovation, and further rates of diffusion become self-sustaining. Rogers (1995) found that following the critical mass point in an adoption, the adoption rate accelerates and that this critical mass needs to occur early within the diffusion process to support use by the average member of the system. Rogers (1995) used the telephone as an example stating that the technology has no utility until more than one user adopts the innovation therefore providing utility for the social system. To reach this critical mass, Rogers (1995) commented that outreach activities and communication should be aimed at the early adopters. Early adopters are often leaders of opinion within a social system and serve as a model for other individuals in the social system.

CHAPTER III

METHODOLOGY

Research Design

This chapter describes the methodology used in this study. The purpose of this research was to gain a better understanding of teacher and administrator perceptions of the challenges and opportunities to implementation of mobile devices in three middle schools in a purposefully selected public school district in the Midwest. A qualitative methodology was used because it best fits the research questions being asked. Data collected from interviews and observations allowed for participants' feelings, thoughts and opinions to be used in a useful way differing from the use of statistics (Patton, 2002).

A case study design was used for this study. A case study was deemed appropriate due to the interest of the researcher to understand teacher and administrator perceptions of the implementation of mobile devices in the district. A case study is used to "capture cases in their uniqueness, rather than use them to generalize" (Gomm, Hammersley, & Foster, 2000).

The underlying epistemological perspective guiding this study is constructivism. Creswell (2007) stated that constructivists believe that "individuals develop subjective meanings of their experiences – meanings directed toward certain objects or things. The

meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas" (p. 38).

Merriam (2001) said,

Education is considered to be a process and school is a lived experience. Understanding the meaning of the process or experience constitutes the knowledge to be gained from an inductive, hypotheses- or theory- generating (rather than a deductive or testing) mode of inquiry. (p. 4)

Merriam (2001) writes that the foundational characteristic of case study research is the boundaries that the case is contained within. Merriam views a case study as different from other approaches to research because case studies "are intensive descriptions and analyses of a single unit or bounded system" (Merriam, 2001, p. 19). The bounded case study approach may include "a program, an event, a person, a process, an institution, or a social group" (Merriam, 1988, p. 13).

In reference to the advantages of a qualitative case study, Merriam (2001) listed the following:

1. Illustrate the complexities of a situation;

2. Have the advantage of hindsight yet can be relevant in the present;

3. Show the influence of personalities on the issue;

4. Include vivid material—quotations, interviews, and so on;

5. Spell out differences of opinion on the issue and suggest how these differences have influenced the result;

6. Present information in a wide variety of ways and from the viewpoints of different groups. (p. 30-31)

Methods and Participant Selection

A case study design allowed me to study the actual change initiatives affecting each site principal and teacher through the eyes of the principal and teacher (Lincoln & Guba, 1985). Creswell (2009) wrote, "The idea behind qualitative research is to purposefully select participants or sites that will best help the researcher understand the problem and research questions" (p. 178). Purposeful sampling provided an information-rich sample due to participant's involvement in the focus of the study (Patton, 2002). The researcher received permission from the IRB to conduct the study on the purposefully selected campuses of three middle schools in the purposefully selected school district to ensure that a cross-section of student population in the district was represented.

Research Population

I selected this specific district due to their progression in implementing mobile devices and current academic achievement, which is among the highest in the state. The district was in the middle stages of implementing a 1:1 mobile device plan and has a large number of middle schools from which to collect data. Suburbanite Public Schools is a medium-sized district with over 20,000 students. The size of the district was also a factor as it provided an opportunity to gain rich feedback concerning the use of mobile devices in these schools. For the specific sites selected for this study, site one has a student population of 1,006, with a free and reduced lunch rate of 29%. Site two has a student population of 866, with a free and reduced lunch rate of 32%. Site three has a student population of 880, and a free and reduced lunch rate of 19%. Specific demographic data for each school site is included in Chapter IV.

Research Sample

Purposeful sampling was used to select participants for this study. Participants consisted of the lead site administrator and two teachers from three different middle schools in the district, for a total of 9 participants. The six teachers and three administrators to interview were selected to represent the lowest, mid and highest socio-economic levels based on their free and reduced lunch rate of the middle schools within the district, also allowing for a cross-section representing the diversity of the student population within the district. The site administrators and teachers selected for involvement in the study were participating in the implementation of mobile devices at the mid-level. Teachers were chosen from the 8th grade level core content areas using a criterion sampling. Surveyed teachers were selected because they had the most frequent daily use of mobile devices. The survey was used as a baseline for comparing Roger's adopter scale to the teachers' own perception of their innovativeness. The survey was sent to participants in an email and from that email they could also choose to volunteer to participate in the interview process. Each of these sites had aligned its technology initiative to the same district and state objectives and learning goals.

Data Collection

I obtained permission from the district office to conduct the study in the district. For a teacher to be considered for selection, the teacher had to be using mobile devices daily in the classroom, and students had to be part of the 1:1 initiative in the district. Teachers were selected from varying content areas participating in the 1:1 initiative to limit the possibility that their perceptions of their curricular areas would not influence their perceptions of implementation. Teachers from the entire grade level, 33 in total

participating in the 1:1 initiative, were included in the survey portion of the study to set a base for data analysis through Roger's theory of the diffusion of innovation framework (Appendix B). The response rate to the survey was 16 out of 33 with a response rate of 48%. In the email containing the survey, participants were asked to volunteer for the interview process. The final pool of interviewed and observed candidates from the volunteer response sampling consisted of one administrator and two teachers from each school, for a total of 9 participants. All of the candidates were invited to participate in the study through email.

In line with a qualitative approach to a case study, multiple sources of data were collected (Patton, 2002). My choice of data collection consisted of interviews and observations (Patton, 2002). Interviewing participants once, I used a semi-structured interviewing technique. The focus of the interviews was on the participants' perceptions of their own use of mobile devices within the change process. An interview protocol is included in Appendix C. I personally transcribed interviews to safeguard accuracy of data, participant meaning, and to ensure a strong understanding of participant's interview responses. Member checks were ongoing throughout the interview process. I also compared participant experiences to each other. The timeline for the interviews was over a six-week period. Within that six-week period I observed the interviewed teachers' use of mobile devices in their classrooms. The observations by the participants identified the innovation, the way in which the innovation had been communicated, the time in which the innovation had taken place, and the social system in which they interacted with the innovation. The coding method used of inductive and the process contained an initial coding, a line-by-line process of the transcribed interviews, a categorization of the data

and then defining themes that emerged. I used Roger's theory as the coding lens for my interview and observation data. Observations were from an observer perspective only, and consisted of teacher use of mobile devices in their classroom to gain further understanding of their interview responses in action. The observational protocol used was be notes divided into two portions; one to collect descriptive notes; the other to collect reflective notes (Creswell, 1998). I gleaned understanding of the implementation process and how that implementation has been communicated to staff within the district.

Ethical Considerations

The first ethical consideration that I made was to ensure the protection of the human participants. Identities, locations and any identifying characteristics were changed to protect anonymity of participants. All participants were informed of the purpose of the study and were asked to sign consent forms. The primary potential risk for the participants was that the participant could fear the release of the data gathered to supervising administrators and the release of interview statements. Participants were given random numerical assignments to protect their identity to which only the researcher will have access.

Steps were taken to not tamper with the natural setting in which the study was completed. The consent form used was the only document that contained identifying information concerning participants in the study. These consent documents were kept in a locked file cabinet in a locked office. No one from the participants' district knew whether or not the participant chose to participate in the study.

Triangulation of Data

Methodological triangulation was used through the researcher comparing the results of the interviews, observations, and comparing the results to see if similar results were being found. Member checking took place during the interview process through restating the participant response and summarizing responses within the interview to determine accuracy.

Limitations of Study

Several limitations existed in this study. Qualitative approaches to research in this case do not lend to generalization of any other population. The researcher was limited in terms of access to participants based on their schedule availability. The district's free and reduced rate of 32% could also have influenced the findings of the study. Additionally, I was doing this study in a district in which I have worked. Therefore, there was possibility that the participants knew or have worked with me in the past. This familiarity could have influenced responses to the research questions in two ways. One, it could have caused participants to withhold information due to the perception that they may not agree with the innovation; and two, it could have caused the participant to be more forthcoming with information due to a previous relation and trust level with the researcher. To minimize this limitation, when selecting participants, teachers were sought that have not worked directly with me.

Additionally, I am very accomplished in technology use and was selected as the State of Oklahoma Digital Principal of the year for 2017. I have made multiple presentations throughout the state on technology use in education. If teachers knew this history, they may have altered their responses to interview questions. To minimize the

influence of this limitation on the study, I encouraged teachers to share openly, and I selected participants that I did work with on a regular basis. I also ensured anonymity for all responses, and I de-identified all data so that individual responses could not be linked to individual participants. I also payed careful attention to the words of participants so that my own biases, due to my personal support of the integration of technology, did not overshadow the perceptions or responses of participants. I listened carefully to participants so that the findings reflect their perceptions rather than my own.

To enhance the validity of research findings, I ensured strict adherence to the research questions and ensure thorough use of member checking after interviews have been transcribed.

Summary

Chapter III explains the research design used in this study. The chapter began with the purpose of the study and the epistemological perspective that guided the research. I also discussed why a case study is the appropriate course for the study. This chapter includes the sampling procedures and how participants were selected. The way in which data will be collected and analyzed is also included in this chapter. The results of the analysis will be provided in Chapter IV with conclusions in Chapter V.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

In this chapter, I present data collected and the analysis of that data collected in the course of this case study. The purpose of this qualitative case study is to understand administrator and teacher perceptions of their ability to effectively implement the use of mobile devices in a rapidly changing, high-stakes accountability environment at the middle-level in three purposefully selected middle schools in a public school district in the Midwest. The collection and analysis of this data is intended to answer my research questions:

1. What are teachers' and administrators' perceptions about the challenges and opportunities that arise from integration of mobile devices in the learning environment?

2. What factors influence their ability to implement mobile devices into the middle-level learning environment?

3. How do these teachers and administrators navigate the challenges they face to implement mobile devices?

4. How do these teachers and administrators synthesize current change initiatives in the implementation process?

Chapter IV includes a description of the school district, survey results, observations and interview data. The data from the participants is organized by their school sites. This chapter also includes thematic discussion within each school site and across the entire district.

Settings

Describing the district and community is vital because it provides the context and background information to enable the researcher, and eventually the reader, to understand the environment in which the case study took place. An overview of the district in which the study takes place provides information about the size of the city the district is contained in, information about the district size and demographics, teacher qualifications and education levels. All personal names, district names, school names and place names are pseudonyms.

Community Characteristics

The population chosen for this study is a suburban school district in a Midwestern state, referred to as Suburbanite Public Schools in this study. The district is in a suburban city with a population of 148,914, that has experienced rapid and continued growth and is very near a large city in the state. The district has a free and reduced lunch rate of 26.7% and is 63% white, 11% African-American, 10% Hispanic, and 16% other, and employs just over 1,100 teachers and 90 administrators with a total enrollment of just over 24,400 students. The city the district resides within is also a college town with an average of

52.8% of adults having a bachelor's degree or higher, which is 13% higher than the state average. The district is one of the largest employers in the community with many parents working in the nearby military and oil and gas industries.

Survey

The survey data was intended to be used as a baseline to understand where the eighth grade teacher participant pool was in their distribution along the adopter scale. Because of the required anonymity and low response rate, I was unable to use it as intended, instead I cross-referenced Roger's theory and used each participants' words. The data collected was intended to provide information on the innovativeness of the participant. The survey also intended to provide data on the breakdown of these three combined middle school sites in relation to their decision stages concerning mobile learning, their decision types, and their learning innovativeness. The response rate to the survey was 16 out of 33 with a response rate of 48%.

Table one describes the mobile learning stage of each participant. The main decision point is displayed in the decision stage, with participants either adopting the innovation or rejecting the innovation. This table shows that that 68.75% of participants we in the later stages of adoption. Table two reflects that 75% of participants did not make the adoption decision on their own but were influenced by an authority or the social structure. Table three represented the participants' feeling of their own innovativeness in regard to the adopter scale. When Table 3 is examined, it is found that there were no participants that self-identified as Laggards and that there was an even distribution of participants, four (25%) in each of the other sub dimensions. This is not representative of

the scale in which Roger's theory operates. These results for table three could have

occurred for various reasons, such as social pressure or a desire to please an authority.

Table 1

Mobile Learning Decision Stage

Sub Dimension		Choice	n	%
Knowledge		I do not have much knowledge about M-learning. I usually see learning applications on mobile devices in people around me.	1	6.25
Persuasion		I think the use of mobile devices in the educational process is beneficial. I am conducting research regarding learning via mobile devices.	4	25
Decision	Adoption	In the time ahead, I will receive the knowledge I need using the opportunities provided by mobile devices.	1	6.25
	Rejection	I do not think that I will obtain the news I need using mobile devices.	0	0
Implementation		I learn the knowledge I need using mobile devices. I use mobile devices in educational activities.	3	18.75
Confirmation		I have realized that learning through mobile devices is beneficial for me. I think mobile devices can be used effectively in educational activities.	7	43.75

Table 2

Mobile Learning Decision Type

Sub Dimension	Choice	n	%
Authority	I used m-learning applications under the influence of people in authority. Social pressure was effective in my decision to use m-learning applications. I obtained	7	43.75

	information about the educational uses of mobile devices due to a demand by an authority (directors or people in authority).		
Environment	Since important people around me used mobile devices, I used these devices for the purpose of learning. My friends' using mobile devices encouraged me to use these devices in education. My family supported in my using mobile devices for educational purposes.	5	31.25
Self	Learning the knowledge I need using mobile devices was entirely of my own accord.	4	25

Table 3

Mobile Learning Innovativeness

Adopter Scale	Choice	n	%
Laggards	I am one of the last to use m-learning applications in my environment / I have not yet used a mobile device to learn new information.	0	0
Late Majority	In the learning process, I started to use mobile devices much later than many other people around me.	4	25
Early Majority	I was not one of the first to use mobile devices in the learning process but I used them earlier than many others around me.	4	25
Early Adopters	When mobile devices were becoming widespread around me, I was one of the first to learn the knowledge I needed using mobile devices.	4	25
Innovators	I began to use m-learning applications when those around me did not have any information about these applications and there were not enough mobile devices around.	4	25

Table four represents the participants' level of innovativeness represented by their adopter category. Participants were identified through the way they operated in the social structure. I applied Rogers' definitions as I gained an understanding of each participants' use of devices and of how they operated within the social system. This data was categorized through cross referencing Roger's theory and through the use of each participants' words.

Table 4

Participant Demographics

Participant	Years in Education	Years at Site	Content Area	M-Learning Innovativeness
Teacher 1a	13	1	Math/ Science	Innovator
Teacher 1b	22	4	Geography/ Foreign Language	Laggard
Principal 1	8	3	n/a	Early Majority
Teacher 2a	21	5	Foreign Language	Innovator
Teacher 2b	18	8	Humanities	Late Majority
Principal 2	18	3	n/a	Early Majority
Teacher 3a	1	1	Science / Math	Early Majority
Teacher 3b	8	4	ELA/ History	Late Majority
Principal 3	17	2	n/a	Early Majority

The Implementation of Mobile Devices

Group I: Middle School #1

This group was comprised of two eighth grade teachers, Teacher 1a and Teacher 1b, that teach different content areas and the head principal of the school, Principal 1a, participating in the mobile device implementation.

Teacher 1a. Teacher 1a is in her first year at Middle School #1, and her 13th year of teaching. Teacher 1a moved from out of state for her spouse's job to teach in Oklahoma. Teacher 1a and I arranged to meet during her planning hour. I arrived at her classroom as she was just finishing a meeting with other teachers. Teacher 1a welcomed me and thanked me for coming; she seemed slightly nervous when we first met. After some small talk and explaining what we were about to discuss, she appeared to relax. She sat at her desk, and I arranged a student desk near her. We reviewed and signed the adult consent form. I started the recorder, and we began our interview.

Teacher 1a started out sharing that she teaches math and science at Middle School #1. She shared that she had a past history of using mobile devices in her instruction and was excited when she found out that Suburbanite District was implementing a one-to-one program. Teacher 1a felt that her role in using mobile devices was, "to help students deepen their learning and to allow them to explore avenues as she acted as a facilitator." When asked how she integrated the use of mobile devices in her classroom, she explained that she, "uses the new tech-book for math that is heavily resourced in technology and online learning." She mentioned that her students are able to gain from her instruction initially, and then continue through the lesson with guided practice supports from the online textbook while she moves around the room helping students deepen in their learning.

When asked how the district influenced the implementation of mobile devices, the teacher shared that, "they provide a lot of upfront, initial training for the use of Chromebooks and the learning management system." She also complimented the, "in depth professional development on the use of the new math tech-book which is heavily

sourced online." She mentioned that it was helpful to have other teachers in the district working on similar textbooks to help her gather ideas and best practices for implementing the new material into her math classes. She also shared that, "through the use of mobile devices she is able to differentiate learning for her students." She said that she, "goes around the room checking with students and they work in groups." The groups are public and she assigns them based on different levels of student ability. Then within those groups she is able to differentiate the levels of learning to make sure it appropriately fits that student's level of achievement. She can do this anonymously through the use technology without having to say anything, but simply commenting or emailing the students individually. She said this helps to "deepen the learning" and it "multiplies her ability to instruct more productively."

When asked about challenges she is experiencing using multiple devices, she mentioned Wi-Fi. She said that, "Wi-Fi is the motherload of all mother loads when it comes to using technology, if you don't have it, you revert to paper and pencil." She stated that she, "always has at least one Back-up Plan and sometimes more and that that is not even enough because the Wi-Fi has been out for up to a week at a time." She contributed this loss of connectivity to the iBoss filtering system that she says, "plays a really huge part in affecting the Wi-Fi and whether it slows down speeds up or just kicks everyone off." She said that she and her other grade-level teammates work hard to have secondary lessons available in case the network is not functioning. She also commented on how, "the superintendent is very supportive and communicates very well during issues with connectivity for the devices." She said that, "he is really 'on the ball' communicating daily, putting out surveys, asking what will help and seeking input from

those using the devices every day." She commented that this is more support than she has ever experienced in any other district and that she feels very supported. She also mentioned that there is not much support personnel for technology in the district, believing that there were only six instructional Technology support people. She said that, new teachers on her team "seem to be struggling more to manage classroom management and implement the devices than teachers with more experience." She also stated, "there hadn't been any training and support for new teachers that she had seen that help them adapt their classroom management style." She also felt that this development could be done through their Mentor program for new teachers and that really they had to have someone in the room showing them how to do it, versus just going to a professional development session.

Teacher 1a also mentioned the challenge of keeping students off of gaming websites that the school district filter system still allows. One that was specifically mentioned was www.coolmathgames.com. She mentioned that, "it has become such an issue that the district is going to ban that site and restrict student access." Teacher 1a also mentioned that in the beginning of the year, as they were just implementing the devices, that she and her other grade-level teammates were more lenient on students playing games. She felt that this was because,

> they didn't quite yet fully understand what they needed to be doing to maximize the device use during class time. Yet as the semester progressed and students and teachers became more familiar with the devices and their uses, the games became more of an issue that was distracting than an actual instructional tool.

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Teacher 1a mentioned frequently, through our interview, that she was "very familiar with technology" and that she felt she was an, "early adopter and willing to try new things because she saw the productivity increase that allowed her to provide greater differentiation for the instruction of her students."

When asked about administrative support from the district and from her school site, Teacher 1a felt that the support was excellent. She commented that she was working with her head principal who is "very supportive of technology implementation at the site," to create professional development sessions for other staff to help them grow and become more successful in the implementation process.

Following our interview, I observed Teacher 1a in her next class. She had very strong classroom management. As the students entered her classroom, they seemed very familiar with the practice of completing their board work on Chromebooks and sharing documents online. She had an interactive short throw projector that students were using to guide what they were working on. Teacher 1a was friendly with students, greeting them with a smile. She was also walking around the room and going back to her desk occasionally to check on a student to see if he/she had turned in an assignment through the learning management system. Students appeared to be clear and engaged as to what they need to be working on their devices. The classroom had the lights off, and white Christmas lights were on with a lamp in the corner and light from the projector.

The room felt calm and organized. The dry erase board had learning objectives on it and the agenda items for class. The teacher continued to instruct and then work with students individually by going to their student desk and getting down on their level by

squatting or kneeling and talking quietly with them. The room was generally quiet, and the room was slightly cool in temperature.

Teacher 1b. Teacher 1b is in her fourth-year at Middle School #1, and her 22nd year of teaching. Teacher 1b has been teaching in the district for her entire career. Teacher 1b and I arranged to meet in the office and have her take me to her classroom. Teacher 1b and I met in the office after I had waited for her for quite a while. She was very welcoming and asked me to walk with her. We had nice small talk as we walked to her classroom, and she seemed generally relaxed the entire time.

When we got to her room, we sat at two student desks facing each other. I explained the interview process, and we reviewed and signed the consent form. I started the recorder, and we began our interview. Teacher 1b started out by sharing that she teaches social studies focused on geography and foreign language at Middle School #1.

Teacher 1b said that she is "not very technologically savvy" and that she has "had a hard time adapting to the new devices." Teacher 1b said that she, "uses the device's occasionally in her room but not daily." Teacher 1b said, "when I need help, I always go to the tech person or send a student to the tech person." When asked what challenges she has as a self-identified "resistor," she said, "I am not very good at using Chromebooks and among the eighth grade teachers, I'm the worst. A lot of times I ask my students for help, and they are able to help me along." She stated that one of the challenges she has is that her "content area does not have a lot of District provided digital resources like other content areas" and that she had to "go online" to find those resources. She said that she, "worked well with others in the building to help support or get support for mobile devices

and that she would often send students to one of the more technologically savvy teachers in her area to get assistance during class." She said that she has a very supportive building administrator that has allowed her to attend the initial training for the use of Chromebooks and the learning management system multiple times without questioning her desire to do so. She said that has been, "very helpful for her to try to understand how to use the technology provided" during the implementation of the mobile devices.

She stated, "the students were not used to having technology like this in classes until this year," and the students, much to her surprise, "did not know how to really use the technology for school work." She mentioned that students were often playing games and that it was difficult to keep the students off games because they would have multiple tabs open in their web browser. She mentioned, "students have up to 32 tabs open in their browser, and I can have up to 35 students in a class." She felt that made it very difficult for her to be able to monitor students' activity.

When asked how she works with others in her building to support the mobile device integration, she mentioned that, "some teachers are confused as to what the technology expectations really are." She said she was "not very tech-savvy" and said, "I don't use them as much as other classes and teachers do. Ideally ,I would use them more if we had an online textbook." She said the biggest challenge is, "just kids getting on them and playing games or doing whatever" causing them to be off-task and that "it is a battle every single day." She said, "what would be helpful is the ability to view student screens from my (her) device so that I (she) could check what students were working on as they were engaged in the lesson."

Teacher 1b stated that she, "feels there is a lot of pressure from the district to use the devices every day in every way possible in the classroom." She shared that her, "own son, who is a freshman at college, has professors tell them not to bring their devices to class because they had become such a distraction." She mentioned that this experience and knowledge has held her back from implementing them as she probably should.

As it took Teacher 1b a while to come and retrieve me from the office and bring me to her classroom as we reached the end of our interview time, her class began to enter her room. The students entering her classroom had a slight impact on the length of her answers and body language that reflected her desire to get up and greet her class and get them on task.

Following her interview, I observed Teacher 1b in her class. She was very relaxed with her students and laid-back in her engagement with them. There was quite a bit of talking between the students themselves, and a little over half of them appeared off task during the warm-up activity. Students seemed to know what was expected of them but didn't have a high level of engagement. Teacher 1b had an interactive short throw projector that the students were using to see the lesson. The teacher monitored the class as they ran through morning announcements from the office and then through their bell work.

Students were on devices and working as they were listening to announcements and her directions. There appeared to be several students not engaged in the task at hand. I observed multiple students' screens on different assignments from other classes or attempting to use a messenger or play games. As the teacher walked around the

classroom, students would change their screens as she got near. The classroom was bright and open, decorated well for the content area. There were not any objectives or an agenda on the board. The teacher taught from the front of the room mainly using a dry erase board. After teaching, she would then give students directions as to their next steps to work on their devices or she give them the option of using paper and pencil. Following providing directions, she would then walk around the classroom monitoring and talking with students. Multiple times, she would sit and just visit with students about things that did not appear to be related to the lesson for the day.

Principal 1. Principal 1has been in the building for three years, with eight years of prior experience before coming to this building. I met the principal of the building in the office just after the school day began. The office was busy with students coming and checking into school late and a couple of students waiting to talk to the principal. He came out of his office, greeted me and asked if I could give him a few minutes to visit with the students that were waiting for him. After he visited with the students, he came out of his office and invited me to come into one of his assistant principal's offices. He was very relaxed. I explained the process where the interview, went over the adult consent form, which he signed. I started the recorder and we began our interview.

Principal 1a began by discussing how last year they had begun a pilot of implementing mobile devices with their eighth grade classes. This year, he stated that the entire school, grades 6, 7 and 8, had joined into the program. He said that the district calls this a "digital conversion." He then immediately began discussing the challenges that he faces in his role implementing mobile devices. He said that students are circumventing and attempting to circumvent their filters, and that they are sharing rapidly through their

shared documents and email access. He said in the year before, students didn't fully understand the potential of their ability to communicate with one another. He also mentioned the use of a filtering software called Gaggle that the district is using that reads all email and documents created by students on their devices. He said that last year they received two to three notifications of violations per week, and now they were getting twice that number every single day.

I asked the principal how they handled that many notifications per day, he said that they use their counseling team to support the violations that are not serious. He also indicated that the administrative team handles the significant disciplinary issues that occur as a result of these notifications. He said that one of the challenges was that, when students misused technology in the past at school, it was usually a cell phone and then the consequence at home was often the loss of the phone. He said that now when students have consequences on their personal devices and I do not have access to them, they use their school device and continue on in the same pattern of behavior.

He mentioned the impact of these notifications on his personal life. He stated that he was "at the gym the other night and got a notification from the software through a phone call, and that at that point had to stop what [he] was doing and involve district administration, the police and assistant principals." He said that he was glad these things are being discovered, but the challenge is that his job has truly become 24/7 and that it was adding he estimated five to ten hours a week of time to his administrative team's load. He called it "the 21st century version of passing notes, except that you are on an exponentially larger scale because they can do it under the auspices of doing their work at school." He said that he feels that they are lacking the needed support to work through all

of the additional issues that the 1:1 program has created. He mentioned a possible dean of students to help with the technology issues and support Gaggle alerts. The principal said that they did not foresee the challenges of students misusing the technology in their classes and that they had been "adjusting on the fly since the beginning of the year." He felt that they were beginning to understand how to better use the devices and that the district had made some adjustments.

When asked what he has seen from teachers implementing devices, he said that "the staff is in a learning curve situation. They are trying to figure out how to use the learning management system and the devices at the same time." He then went on to tell me that he believes his "staff was at about 50% successful usage to some level and 50% not well implemented." He mentioned the challenge of trying to onboard his staff fast enough to keep up with the students and provide quality instruction using the devices so that they were actually being used for their intended purpose. He said that teachers were experiencing on the job training to keep up with the need to change instruction.

I asked him if he could expand on the comment referring to on the job training. He said that the 8th grade teachers that are in their second year of the implementation are much more successful. He said that the program timeline for implementation had been bumped up because originally each grade level would have been added over a three-year period. He said that the 7th and 8th grade levels were added at the same time. He shared that the 6th and 7th grade teachers hadn't had the extent of planning and training that the 8th grade teachers had prior. He said that this lack of training was causing challenges for some of his staff and limiting their ability to implement the mobile devices. He explained that he has "some teachers that are very techie and digital forward and that they were

implementing on their own and figuring out ways to solve problems and help others." He

also mentioned that he had the other half of his staff that were more "analog" and they

were "struggling to use the devices because they were not in support of the initiative,

didn't understand how to use the devices, or didn't want to recreate how they taught their

classes using a different method." He pondered if it was a generational issue, or just a

willingness to try new things.

I asked him how the district supported of the implementation and what that has

looked like as they prepared for the implementation. He mentioned that the training from

the district was half from the district, at the central offices, and that the other half was

site-based training. He mentioned that there are teachers in the building that are called

"technology specialists" that receive an additional stipend to help support technology in

the building and that they had been providing training during site professional days and

various times during the day for adult learning. He said that these technology specialists,

or as he called them "tech specs," would receive training from the district and then pass

that training down in a "train the trainer" manner. He said the teachers initially had to go

through what he called their "basic training" to even get their own devices. He said that

this training included the use of the Chromebook mobile device and the learning

management system. He said the district also provided some additional "if you are

interested trainings" that went through the summer and have continued through the

school year. He shared that most of the training had been teachers working with their

colleagues to figure out the different parts of the initiative and make them work. He

mentioned that, for his technology specialist, he had built his master schedule to lighten

the load of his teacher doing that work to allow them to support the increased need for

support. He said that scheduling was something he had done on his own; it was not a district recommendation. He simply wanted to address the needs he saw. He also said that the district provided them an additional two to three hour per day technology specialist to be on site at the school in the mornings. He shared that person has been helpful in working with the site technology specialist to provide additional training for teachers.

I asked for clarification on the expectation of training and whether the district had set forward a plan that he needed to accomplish or if he had been given any specific direction outside of the basic level of training and additional training the technology specialist received. He said that he had "not received any training from the district-level to help support his teachers." He also said that "the teachers are far more savvy with the learning management system and Chromebooks" then he is. Principal 1a admitted that "teachers know how to live in their Chromebook world" better than he does and that he doesn't have the capacity to go into the system to support any issues they may be experiencing. He said that they did receive "a basic learning management system 101" at his site that the district set up to give him a very basic overview of how the learning management system operated. Their intent was to support administrators in their ability to communicate with parents and answer questions they might have at a very basic level, he described. As far as his understanding how to work in the program and assist teachers with any issues they might have with uploading assignments, creating assignments, creating calendar events, communicating with students, he did not have that training.

I asked him how he had influenced the implementation. He said that it was part of his site's improvement plan over the last three years. He indicated that he knew that this initiative was coming because he had been given "a heads up" of the transition from the

district. He said it was not required at the district to do these additional trainings in his site improvement plan, but he felt that it would better prepare his teachers for the transition. He recognized that it was a very big transition for his staff and felt that it justified a significant place in their growth plan. He had prepared for a two to three-year rollout of the devices that was then accelerated outside of his control. He said that they had done differentiated training for teachers so they could self-select from their entry-level to a mid-level to an expert level training on the implementation of devices. He stated further that the district only gave him three to four months' notice that the rollout would be accelerated and that this news "caused the site to scramble a bit to prepare trainings in the beginning of the school year to allow them to help better implement the devices."

I asked who he included in the decision-making regarding the technology implementation, whether it was him alone, or whether he had a team helping him to decide. He said he allowed for his site technology specialist to drive the instruction and training and that she had been at the school since he became the principal. He stated that she was good at receiving feedback from teachers on needs in the rollout and answering questions. He also mentioned that they had sent out surveys the previous year that asked questions of how teachers were doing and how their understanding was progressing. They created their own leveling system for teacher certification much like in becoming a Google Certified educator. He said that they set steps in place that would allow teachers that meet those steps to move to the next level to help progress staff through training so they wouldn't just continue to stay in one place but would continue to grow in their knowledge and use of the new technology.

After we discussed the support he provided for his building and the struggles with his transition for his site, I asked him what opportunities the devices had created for the enhancement of learning in his building. He said there was overwhelmingly positive feedback. He felt that the devices allowed teachers to have "quick resources at their fingertips," and as long as the students had their device, they had all the basic supplies they needed for class. He said that even in disciplinary situations when students are out of class, they still have the opportunity to access a significant amount of the work and instruction as it was taking place. He stated that there were less reasons for students not to have what they need because "the devices were the go-to place for learning."

I asked if connectivity had any impact on student access. He indicated that, early on, there had been some connectivity issues, but the district had been "doing a really good job on supporting those and building capacity for the network to work at a high-level to support learning on the mobile devices." He mentioned that there were a few instances in the beginning of the year where the iBoss internet filtering system had gone down. However, the district had recognized that almost immediately and notified the sites and staff and had shut down the network to limit students access to unfiltered internet. He said that the explanation for that issue was that they were driving the entire filtering system off of one server and that it couldn't handle the load and, consequently, shut down. He further indicted that, to his understanding, the district was talking about accessing multiple off-site servers that could serve as backups in case one went down at the other could maintain the filtering system security level. He said they have not had any issues, that he's aware of, since that incident. He also mentioned that the district had put in place a ban on student personal devices, specifically cell phones. He said that this is

actually been very helpful in his opinion because it has focused students on to the devices that the district provides for them to learn and to use correctly and that there is not an opportunity for them to use social media during the day.

When I asked about what recommendations he would make to others that look to implement mobile devices, he said that one of the challenges as a school and as a district he believes is always trying to improve and grow to do a better job of serving their students. He said that "one of the things that you can't do in an initiative like this is have multiple focuses. You can't have nine other initiatives going at the same time and this can't be just another one of those things that you had to do." He said that, in many ways, "it feels like almost throwing the baby out with the bath water. The teachers were having to really relearn a lot of their initial pedagogical practices and beliefs to adjust to the system of implementing mobile devices." He indicated that the math textbook that was chosen for the district has provided significant training; he mentioned at that training is "almost been like drinking through a fire hose" for staff. However, although there were varying opinions, he believes that the implementation of that curriculum has gone as well as it realistically could have gone. He said the district in that area of math is providing an incredible amount of support for the technology integration. He also stated that there were "more growing pains communicated" to him in the first semester, and as they've entered into the second semester of the school year, he had not heard as much in terms of issues.

This principal also indicted that he thought the district had done a good job of making this initiative a priority. He stated, "if you don't make it a focus in your top two or three and it's just for the year, it really gets done halfway and never fully implemented

and it has a hard time sustaining future growth and continued use." He communicated

that, as they move into next year, the 8th grade teachers will be in year three of the

implementation. He stressed that it was important that they stay focused on initial training

for new staff and continue to help support staff that still struggle with the

implementation. Further, they will need to provide opportunities for learning and growth

to those that are advanced in their use of the technology and are leading the way. He also

said that it is "very important that they focus on the implementation of this through the

new staff [that] is added in the coming years." He explained,

> fifteen to twenty years ago, if you entered teaching for the first time, or entered
>
> into a building for the first time as a new staff member, you could generally figure
>
> it out as it went. Instructional practices were generally analog and focused a lot
>
> on lecture and paper and pencil. Now with the use of technology becoming such a
>
> core component of the pedagogical practices, it's going to be important to
>
> continually train and onboard new staff to help them adjust as well.

He also believes that that training falls on the shoulders of the colleagues to help new

teachers on-board.

He also indicated that he wondered if the universities that are providing the

teacher preparation programs were providing this level of training. He said that with the

teacher shortage in the state, many teachers would have no training from a university as

they are often emergency certified. His opinion was that this lack of training would add

an additional layer of challenge for those types of educators entering the field. He did

mention that he, "feels the job of teaching is just getting bigger and bigger." He stated,

"we, as a district, need to ensure that they have supports in place to help keep teachers in the field as more is expected of them."

In this building, implementation has been a learning experience and although this principal had been through many different change initiatives for a school site, he felt that while this might be the technology component, there will be something else in another year or two that replaces it. Yet, he felt it was "important to stay focused on what they were about." He said that the technology implementation was more than just adding a simple strategy, but that it was adding an additional foundational practice that he called a "lifestyle change" for a teacher. He indicated that he doesn't believe that this implementation will truly ever end because he "doesn't see an end game." He said that schools are "always going to be growing, evolving, and adapting to new technology as it's developed."

Group I Themes. Through the three different interviews at Middle School #1 a theme emerged of **initial training taking place that is viewed as valuable and beneficial, with some teachers taking the training more than one time.** The interviewees all mentioned that from the initial training to actual implementation in the classroom with lessons and content, there appeared to be a gap. One content area had better support through a new text book that supported online and mobile device learning, where other content areas do not have such supports making it more difficult to implement the mobile devices successfully.

The group, although diverse, all mentioned the inconsistent use of the mobile devices during classes. There we multiple and various contributing factors mentioned. Teacher 2a mentioned not having resources for her content area and the struggle she was

facing with understanding and using the technology. She stated, "I am not very good at using them [Chromebooks] and among the eighth grade teachers, I'm the worst. A lot of times I ask my students for help they are able to help me along." Teacher 1a also mentioned inconsistent implementation in classes, but she felt very supported through the additional training received with the new math online textbook. Principal 1 mentioned "a lack of clear expectations from the district in what the implementation should look like when done successfully."

Additionally, a theme emerged in addressing issues that were slowing the implementation's success related to students accessing online games. All three members of Group I mentioned the Cool Math Games website as a distraction and hinderance to instruction. Both of the teachers desired to have the ability to view student screens during class. The teachers and principal felt that this was due to a lack of student training on how to use devices in school versus their familiarity using personal cell phones. Teacher 1a mentioned that she was never provided with any training or curriculum to help her teach the students how to use the devices and that "teachers that aren't as 'techie' allow students to play games as a way to manage their classes." Teacher 1a, admitted that she, struggled "managing how quickly some students complete their work and then don't have anything to do." She then said she had initially allowed those students to play games or browse the internet until others had finished, but it had quickly become an issue as student would not do their work and preferred to play the games instead.

Finally, the Group I participants acknowledged the diffusion and growth of the implementation as the year had progressed. As teachers and students became more familiar with the devices and learning management system, the use of the devices had

improved. Teacher 1a stated, "those of us that are tech savvy have seen our productivity and quality of instruction increase throughout the school year." Teacher 1b, a self-identified "resister of the technology implementation," said she had grown to see the value of the devices as colleagues had supported her and shared ideas with her.

Group II: Middle School #2

This group was comprised of two eighth grade teachers, Teacher 2a and Teacher 2b, that teach different content areas and the head principal of the school, Principal 2, participating in the mobile device implementation.

Teacher 2a. Teacher 2a is currently a Spanish teacher and is in her fifth year at this school and has taught for 21 years. Teacher 2a met me in the office, and we casually chatted as we walked down the hallway to her classroom. She seemed very relaxed as it was during her planning time after she'd already taught her first class of the day. We engaged in some casual conversation that led to a segue to discuss the interview and how that was going to look. We discussed the adult consent form, and I asked her if she was ready to begin. I then began recording and started the interview.

Teacher 2a began immediately by sharing that she had taught for a long time in a few other different school districts than the one she is currently employed with. She stated that she feels it is important "to teach the students how to use the technology they have, appropriately." She felt that "instructing the kids to use the technology they have will have benefits on their future." She also stated that she enjoyed having the students work collaboratively on projects because using the technology allowed them to have conversations without actually talking all the way across the room. She said "it was neat to see them [students] work creatively and find things to input into a document or

presentation all while sitting in different areas of the room and working on different parts of the project. She also enjoys the ability to, as she stated, "jump in on what they're working on as a group through my own device and monitor them and provide feedback in a much faster way they can follow up on later or address at the moment." She also felt it was important to teach her students "about the balance between using technology and not using technology for learning." She said that she still found "a large amount of value in the 'good old-fashioned way' of teaching students to learn." When asked about how the implementation has been supported by colleagues and how they work together, she mentioned that her team teacher was very "technologically savvy" and did quite a bit of digital instruction with her students, a practice that "helped her a lot." She said that they are not using a textbook currently for the course and that it was "neat to have the students find additional resources or be able to point them to additional resources to help them learn" because it was, often, more relevant to the student.

One of the benefits that the teacher discussed was the use of email. She stated that she "encouraged students to email her if they had questions outside of class time or even outside of the school day." She said that "at first, students were hesitant to use it or were unsure of using it." However, as they emailed her, and she responded quickly in the evening or afternoon or even on the weekend, students began to email her more frequently. She said that she thought that part of this was that they were not used to this form of communication with the teacher, and the other part was just becoming familiar with using email and how the technology worked. She said that the use of email has been a very much a core part of what she did for instruction to help students learn when they can learn. She said that "often, students process what goes on in class and take work

[home] to work on later or to complete later or maybe even have questions about the daily lesson." Through this type of communication, she was able to answer questions for them and even use it as a sort of formative assessment to gauge the level of mastery for her students in her content area.

I asked a follow-up question about how she, as a teacher, managed her work and personal life balance when she's responding to email so frequently. She laughed a bit and said, "sometimes it's hard." She even made a joke to her students that the only time she really wouldn't email is if she was sleeping or driving. She said that "the value of the instant feedback to [her]students helped build relationships and also helped them see the value in what was being taught." She felt that the time it took [for her to respond by email] ended up moving the class along faster and that students were able to engage better because of the relationship they had with her. They were also encouraged by knowing that she was going to help them along the way by providing feedback.

When asked how the school district had influenced the implementation of the devices, the teacher stated that they had taken away her textbooks. She said, "they [the district] really had eliminated the options for not using the technology the district had provided." She said, "the district had really forced us to move forward this school year." She said the district did it "by force and not necessarily in a negative way. I just meant that they were really pushing us to this new way and new tool of instructing." I asked her how the district had supported her with resources since the textbook was not being utilized and if the district had helped provide any resources for her or training for her. She stated that the district had not and that she did "feel a little bit on my own to create new material for students using these devices." She also stated, "it has been a challenge;"

however, that she and her co-teacher teammate had worked together to try to make this as positive of a transition as possible.

When asked how the building principal had influenced the implementation, the teacher stated that she didn't feel the principal had had that much of an influence on it for her. She said that the curricular areas in the building were divided up among the administrative team and that the principal was not over her specific curricular area. Thus the principal of the building met with and lead other content areas. I followed up with a question regarding how administration works, in any way, to facilitate additional professional development for staff. She said that the administration in the building did provide professional development, but it was not led by the administrators but by teachers. She said, " the teachers are more of the experts." She then shared, as what seemed to be her own self-reflection as she spoke, that it probably made more sense because the teachers were the ones dealing directly everyday with the Chromebooks and Canvas. She concluded that it probably would make more sense for them to do it than the principals.

When I asked what opportunities the mobile devices had provided to enhance learning in the classroom, the teacher paused for a brief moment and appeared to be searching for what could be perceived as the right answer. She then stated that, with her content area, "the use of mobile devices allowed it to be more global in the student learning because of the access they had to other people across the internet." She mentioned there were many resources available on Discovery Education, which was a software purchased by the district to help support the digital transition. She said that the district had spent more time training this year on that tool. This training had been helpful

because they had the software in the past but just didn't understand the full options available within that resource. Teacher 2a also stated that she would like to work on setting up video chats with students in other countries. I asked her if she had tried that yet, and she responded that she had not. She said that she would like to but she didn't feel comfortable yet with knowing if it was possible or if she could actually handle facilitating those conversations at this point.

When asked about the impact mobile devices had on teaching and learning in the building overall, the teacher again focused on her PLC (Professional Learning Community) partner, stating that colleague used all digital resources for teaching. She said that the implementation had entirely transformed teachers' classrooms, and most rarely, if ever, did anything using paper and pencil. The teacher also mentioned the use of technology to help run data charts, track different information, or create reports in different classes; specifically she mentioned science and math classes. She indicated that, in the math courses, their use of the new textbook, which she had seen when shared by a colleague, was very digital and worked very well in partnership with the new devices.

When asked about challenges, the teacher stated that one of the biggest challenges she has had is "just keeping up with all of the new technology." She indicated that learning the technology takes a large amount of time, and she stated that implementing the technology into a lesson takes even more time. She did, however, feel that implementation has gotten easier as the year has progressed, and that she has become more familiar with the technology. However, she stated, "at first it was very difficult." She still doesn't "feel super comfortable with using technology in everything,;" however, she is "trying to get better at it every day." She also indicated that students helped a bit

with the challenges she was having with technology. She said that she would "tell the students that I would like them to do an activity in a certain way, and I would tell the students that I didn't know how they would do that. Then, the students would tell me how to do it."

I followed up by asking her what the minimum expectation was from the district to use the technology. I questioned , with the lack of textbooks, the increase in digital resources and just the transition away from traditional paper pencil learning, what she felt the district expected from her as a teacher. She said that the district had "never shared anything about a minimum expectation of using the devices in the classroom." I asked if maybe there was a hidden rule or unspoken expectation, and she said that she didn't feel that there was. She said that she felt "it was more of an approach from the district that it's your choice, 'here are the devices, tools, and resources available, and if there is any way we can to help support you to learn how to use these tools to better students learning let us know.'" She mentioned that one of the challenges she has had was "the Wi-Fi staying up." She said that she would often give tests or quizzes through the learning management system on Fridays and that the wireless internet would stop working or crash and kick everyone off. She said that it "was incredibly frustrating and it was hard to adjust your lesson when everything is done in a digital way that is all stored in the cloud and not on the device the students are using." I asked if the wireless internet access had been down recently, and she said that it had gotten better. As the teacher paused and reflected, it was evident that the initial Wi-Fi usage had been an issue of concern but that it had gotten better. However, this concern made this teacher apprehensive on trusting the technology as she wondered if it would actually work when she truly had to depend on it.

The teacher also mentioned that, at times, students didn't have their device with them at school. These situations happened whether they forgot their Chromebook at home, it was broken, or they had even been restricted due to violations of the District policies. She shared that when she would give a test in the learning management system, Canvas, it was difficult because taking a digital assessment and trying to make it a paper and pencil assessment, for those who did not have their devices, did not work very easily. She mentioned specifically that an assessment she had prepared on Canvas, the learning management system, "needed to be converted to paper and pencil for a student without their device, and when it printed out it was over 32 pages long." She said this was due to the way that it formatted when printed from Canvas. She said that she basically had to write the same test two different ways and always have an extra paper copy available. She indicated that she hoped this problem was solved soon because it was doubling her workload every time she wrote a test.

I followed up by asking her how often students did not have their Chromebook with them in class, whether this was due to forgetting the device at home or through being restricted from using the device by the school. She said that, on an average week, she estimated that she "had two to five students during the week out of a load of around a hundred and fifty students that [she] sees every day that would not have a device." She also mentioned that it was getting much better as the year progressed. She said that students were learning the expectations of the using the devices and that they were realizing how vital having the device was to helping them get their work done in school every day. Teacher 2a also mentioned that students often didn't have their devices charged all of the way. She said that, at school, they were not supposed to be able to

charge their devices at all, but that she often let them charge their device so that they could participate in the lesson. She indicated that although this rule existed, she felt that "the students learning was more important than holding to a rule about not charging the Chromebook at school." She also said that students would often borrow each other's Chromebooks when there was a test, login as themselves on the other student's device and take the test. She said she wasn't sure that was within the rules, but that she allowed that to happen.

When asked what suggestions she would have to help in the implementation of mobile devices, she said that "the teachers' issue is always time. Time to plan, time to practice with the new tech, just time in general." She said that she had experienced this issue personally many times where she would "want to try something new but not have the time to practice and end up just trying it for the first time in class with students." She said the real thing that teachers need is time. She clarified, "not time to be in PD, professional development, but time to take the things that we have learned and practice them on our own as we build our lessons."

I asked the teacher if she had any final thoughts as we came to the end of our formal questions, she said that she "really liked the Chromebooks as devices," but was "concerned that Google isn't used outside of the school system." I asked her what she meant by that, and she said that "in the real world, Google isn't the main way that business happens." She said that "different software like the Microsoft Office Suite was used much more than Google applications." She wondered if, by using Google so heavily, students were being set up for failure or future struggle.

Following our interview, I observed her next class hour. The lights were all on in her room, and it was decorated on most of the walls. She was very "laid-back" and stayed seated as students entered, talking with a few of them that came up to her desk. Students sat down and began talking with one another. The classroom was set up with the majority of desks in rows and a few tables in the rear of the room facing toward the front of the room where the Smart Board and dry erase boards were located. During the lesson, students were doing presentations on an assignment that they had been working on previously.

As students were presenting, other students were conversing in the back of the room, and the teacher was seated at her desk near the front of the room grading the presentations. During the presentations, the teacher talked to me as I was seated near her desk and told me that this was her highest performing class. This was a class where she is very relaxed and allows students to be more talkative. There were no devices out at all in the class. All students were taking notes on paper in response to each student's presentation. Student presentations were a mix of a single PowerPoint slide and posters based on the student's choice of topic. The teacher was using paper rubrics to grade student presentations, and throughout the entire time that I observed the students, their Chromebooks were closed and either on their desk or underneath their desk in the tray attached to the desk.

Teacher 2b. Teacher 2b is in her 18th year of teaching, and her eighth year in the current building. She teaches a humanities course. I was led to her room by a teacher that I had just interviewed in the same building. As I entered her room, she welcomed me immediately, standing up from behind her computer near her desk, and asked me to come

and sit down near her. I set down my backpack, and we engaged in some casual conversation. I discussed with her the interview process and the consent form and asked her if she was ready to begin. She said "yes," signed the consent form, and we began recording our interview.

I began the interview by asking the teacher what her experience was with mobile devices in her room. She stated that,

> this is my second year using Chromebooks and students' first year for them. Last year they were in seventh grade and did not have Chromebooks while I had Chromebooks with the students that were in eighth grade last year. So I have experience for a year and they have none.

She said that, "it was a challenge in the beginning because I had to remind myself that students hadn't used devices last year like I was used to with my former students the previous year." She also said that one of the challenges she experienced right away was that last year's teachers that had tried to be proactive and forward-thinking in using digital devices, had ended up using Google Classroom instead of Canvas, the learning management system that the district adopted. She said this caused her to have to "do a lot of reteaching and relearning for the students on how to submit work and how to see assignments and the calendar of assignments."

She also mentioned that, in the beginning of the year, she had to set aside her content and curriculum to teach the students how to use the devices and the software. She said that she, "had to teach them how to use Canvas" and explained how she specifically used Canvas which she stated, "was different than other teachers and more aligned with what the initial District expectations were." She expressed frustration that other teachers

were not following the district expectation for how to use assignments and submit assignments using the learning management system. She said that, often, students were confused as they worked in different classes throughout the day. She also said that her class was, "99% digital" versus other teachers who didn't use the devices as frequently as she did.

I then asked her how she had implemented mobile devices in her classroom, and she mentioned that she had stated earlier that she said she was "99% digital" in her instruction. She responded, "I do everything in my class digitally." She said that she does, not "use any paper in the class except for one map in the very beginning." She said that all assignments, bell work tasks, and projects are turned in through Canvas.

I followed up asking her how she worked with her team of teachers in the grade level to implement mobile devices. She said that she helps, "anyone who asks me for help." She said that several teachers would try to get her to write their lessons for them and that she felt that sometimes she was being "used by her teammates and colleagues to create digital content for them." She said this expectation caused her to not be as collaborative as she initially was because she felt that not everyone was contributing to the work. She said that often she, "would be the one that's solely created lessons or ways to use the devices and that no one else would contribute; they would just simply ask [her] to do it for them." She said that administrators in her building had asked her to work with a couple of teachers that were laggards, and she attempted to help. However, the teachers would tell her that they really weren't going to use the devices, but that if she gave them the lessons they would just use what she did. She said that wasn't what she felt was a good use of her time and that other people, administrators, district technology staff, could

train them on their time. She said that she was more than happy to collaborate and teach teachers as they were working through creating their own content, but that often she felt that she was just being "used by others."

I asked her how she became so competent and she said that she, "did have the advantage of time as [she] did not have children at home and her husband worked as well." She said she didn't mind sharing and understood that she had more time than a lot of her colleagues, but wanted them to play an equal part in creating lessons. She said that she had poured all of this time and energy over the summer preparing for this school year and throughout breaks and during her planning time that other teachers had not and felt that they needed to put in the same equal amount of effort.

I asked the teacher how she felt the district had helped to support the initiative of using devices in the classroom, and she said that she did not feel that the district was very helpful at all. She said from her perspective, there was, "no real plan for how they should be used in the classroom for her content area and for many content areas that her colleagues teach." She said there seemed to be a clear lack of consistent expectations. She said that, initially, there were rules or guidelines set for how the learning management system and mobile devices would be used and that later these guidelines seemed to be abandoned as more teachers came on board with the adoption. She said that there was, "never a plan communicated on how to train students" and that she felt this was simply given as an unsaid expectation that teachers would be the ones teaching the students how to use the devices when often they didn't know how to use them themselves.

She said that, in the initial training she went through on the learning management system, the district had communicated the desire for the class syllabus to be the

homepage for that class. However, as more teachers came on board and were not doing posting the class syllabus, there was no real "checks or balances" in place to ensure the fidelity of that expectation. She said that use of the learning management system varied greatly between classes even with her PLC partner using canvas in an entirely different way than she did. She was disappointed that there had not been consistent expectations followed through by the district. She said no one had followed up with her or other teachers to see if they were using it in the way that, she felt, was clearly communicated from the district. She said that this is probably "due to the volume of people suddenly using the devices now because the year before it was a pilot program." This year, Canvas was used by all teachers in the building. She also mentioned that, in a later training she attended that was provided by the district, district technology trainers were showing what other teachers' Canvas pages looked like. They were actually saying how creative and how wonderful these pages looked even when teachers did not have the syllabus as the main page, and the pages were not laid out in a way that she felt was communicated originally. She said that this made her unsure as to whether she was "doing it correctly," but she had invested so much time and energy into building her Canvas content that she didn't want to change.

According to this teacher, inconsistency had led to many of her colleagues telling students to close their Chromebooks instead of opening them in class. She said that she thought other teacher did not use Chromebooks because of a lack of support and expectations from the district, but she also thought the adjustment to classroom instruction could also be one of those challenges that was causing teachers to tell students to put their Chromebooks away. I asked her a follow up question regarding whether she

felt that more training on the devices for teachers might help, and she said that she thought that "it would" and that "teachers would benefit from additional time to work together to learn how to use the devices in their classes."

I then asked this teacher if the building administration has helped support and facilitate the implementation of mobile devices. The teacher shook her head and said, "no." She said that they had not really supported the implementation. I followed up asking her if, in her perception, that the administrators had received any training or guidance to help them. She said that her principal was "one that got things done when she was told and really followed through," so she doubted that anything had been done to train her principal.

I did ask the teacher how the implementation of mobile devices in her room had improved instruction or impacted instruction. Her body language changed, she smiled, she got louder, and her speech sped up as she shared with me the many ways that she felt students were impacted positively through the ability to use their technology in her class. She mentioned that, in her class they

> were talking about different cultures and the way that they lived and students were asking [her] questions about the different houses and different housing availability in different countries. So [she] simply steered them back to the devices to answer their own questions.

The teacher also said that she felt that students in her class were getting a "very high degree of digital learning." She emphasized that everything she did in her class, and as I observed her teach, was based in a digital landscape. She used things that were relevant to students, such as pictures of an Apple Watch with different apps the students

would click on through their device or on the Smartboard screen at the front of the room. This teacher described multiple situations where students were able to ask questions, and she was able to facilitate their learning versus telling them the correct answer. She said that the use of mobile devices had helped her students to change the way that they viewed her class and that they often came more interested and asked more questions. She said, "that this was an unintentional side effect that really was a positive benefit that helped students go deeper into the content." She was teaching without actually having a plan for learning to take place. She said that these kind of questions would lead to projects for students to complete that were far better than creating a PowerPoint to share with the class or write a simple paper. She enjoyed helping students create multimedia presentations that they worked on collaboratively together even across different class periods. Students in similar classes during different times of the day were able to work together even though they did not attend the class during the same hour.

I asked the teacher what challenges she's experienced through the implementation of mobile devices. Her first point was again that there was "a lack of uniformity in the school for expectations for students and teachers on how to use the devices and Canvas." She said that there were "issues due to lack of training with students on how they [the students] problem solved tech issues." She gave an example of a student attempting to turn in a paper in an English class. This student was having problems and asked during her class for help, and she was able to help. She said that "students often struggle in that way, but they've gotten better with understanding the technology and how to use it." She said that even though it comes with challenges for students learning how to responsibly

use the technology, it has given a lot of students a voice that normally would not have had a voice.

I asked her to share more about challenges that have other teachers have experienced. She said that "being able to use the technology at the level that they are currently, is the challenge." I asked a follow-up question to have her explain a little bit more regarding what she meant, and she said, "the trainings for teachers the district provided are very basic in nature." She said, "some teachers are struggling to understand even the basics and other teachers already knew the basics before attending the training, and I needed more advanced training." She said that there wasn't really any way, in this district, to set up and scale the training to best fit what each teacher needed. She stated, "sending out a survey or asking questions of teachers for their level of understanding of technology would have been helpful prior to implementing the devices." She indicated that there are teachers that still do not understand how to fully use the Gradebook and even send grade notifications through email. She also said, "there isn't anyone that has really offered or been able to help her with her use of technology" as she is an "advanced person in using the technology" in her building.

The teacher again referred to the multiple ways in which she is helping colleagues in her building and across the district. She has friends struggling with the technology implementation. She said that she ended up being in a train-the-trainer type situation as she trained other teachers how to help each other. She again felt that this was related to the lack of a district vision that was clear regarding how they were going to implement the devices. She felt that it "was kind of like they [the district] are 'flying by the seat of their pants'" to make sure that the mobile device initiative worked. She believes that

concept of mobile devices and digital learning is a great idea and she loved the technology; however, planning ahead more might have helped it be used better in a more efficient manner.

Following this question, I asked her what suggestion she has for improving implementation at mobile devices. She said simply "a plan; something to follow that is consistent and clear for everyone involved." She discussed a leveled plan that had different phases of training with follow up to support teachers in their learning. She said, "having that consistency is so important for the students." She said that "everyone having the same expectations and the same basic format of using the learning management system and the devices helps the students." She also felt the learning had been a little slower this year for students than it probably could have been had they done more training that was aligned and had actually had followed-up and supported those teachers that struggled. She said that she actually had less time to teach content this year due to the fact that she has had to spend so much time teaching students how to use their devices. I asked her how much time. She estimated that this time was "probably around three to four weeks of instruction lost in the fall semester just working on technology training."

Following our interview, I observed her class. She shut off her main classroom lights just before students entered and had multiple lamps and Christmas lights to light the room. Her room was decorated very well for the content being taught and had high interest areas around the room. As the students came into the room, the teacher was moving around as the class started, and students came in and opened up their Chromebooks to begin working on the bell work already displayed on the front Smart Board. Students were seated at tables of four with two on each side facing each other.

The class was full and there were no empty seats. I counted 31 students in this class.

Students often referred to their notes on Chromebooks when they were called on to work

the bell work at the front of the class on the Smartboard. The teacher was acting as a

facilitator for the class and not giving answers but simply asking questions in guiding

students as they completed the guided practice to begin class.

Students then worked on the Smartboard randomly answering questions about the

date and counting by random units to 100. Students were working on their own following

the bell work and completing semester notes for their final. The room was quiet and

appeared to be very well structured in classroom management and procedures.

Expectations for student behavior appeared to be very clear. It was two days before

winter break, and students were engaged, and the teacher was walking around the room

checking on student progress as they worked. The teacher had icons on the board, (e.g. an

Apple watch face with apps that students clicked on to link them to need info). This

teacher spent most of the time in front of the room at a presentation stand, occasionally

walking around the room to check on students. She often used her Chromebook at the

front to check on students' work they were completing digitally. The teacher had created

complex Google Sheets that reflect the correct or wrong answer as students typed

information into them. As students were creating their notes, if they weren't using

keywords required, the cell in the Google Sheet changed from green to red to allow the

student to spot check their level of understanding. This feature also allowed the teacher to

quickly assess whether the students were on the right path. The teacher was able to

differentiate the level of instruction by facilitating the student learning in such a way that

allowed for students to engage at their level during the lesson. The students appeared

focused and engaged and very clear on what they were to do using their technology throughout the class period.

Principal 2. Principal 2 has been in the district for 18 years and in the current building for three years as the principal. I had scheduled an interview through email with this principal. When I got to the school shortly after the day began, the office was quiet, the secretaries were typing on their computers, and no students or parents were waiting. I said "hello" to the secretary, and she visited with me for a brief moment, asked why I was there and said that she would get the principal for me. After a few minutes, the principal came out and greeted me and took me back to her office. We chatted casually about how the school year was going and how her day was going; then I went over the adult consent form with her, and we began our interview.

I asked the principal to describe the use of mobile devices in her school to begin our interview. She began by describing the use of personal cell phones by students, stating that they can use them up until the first bell of the day and then they are to be put away until the end of the instructional day. She mentioned that the main devices used at school were Chromebooks by the students and staff. She said that they have 1:1 adoption in their building of Chromebooks for students in 6th through 8th grade. She said that students and staff get to take those devices home with them each day, and they use the mobile devices as a foundational tool for their learning. She stated,"they use their devices all day in nearly every class." I asked what she meant by "nearly every class" and which classes they might not use the devices in during the day. She said that physical education was one of the classes that they rarely, if ever, use their devices.

I asked her how she had seen teachers use mobile devices in their classrooms. She said that they are using them through different apps on the devices and mainly through the learning management system, Canvas. She also mentioned that they use the Google Suite of applications available online, (i.e. Docs, Sheets, Slides, etc.) She said that the majority of their textbooks are also online. She said that the math textbook is actually called a "tech book" and that "it has been very nice to use this year." She further indicated, "the new book for math is integrated well with the learning management system and the devices that the district has chosen to implement."

She then shared how she works with her team to help support the implementation of mobile devices in her building. She said that, at the district level, there is a website that has great information for students and teachers. She also said, "there is a newsletter that comes out occasionally from the district" and that she would often look in that newsletter to find what new and innovative thing she could help share with her staff. I followed up by asking her why she looked for innovative things in the newsletter to share. She said the newsletter had been helpful in showing her teachers what they could do and how using the new idea could impact students in a positive way. She said that one of the challenges they've had and had to overcome was having things read aloud to students to meet their special education supports. She said that the devices have many restrictions placed on them to help keep them secure so that students aren't using them inappropriately. She said, "due to this we have had to find workarounds to help support the read aloud function for a lot of the software."

I followed up to her comment by asking her how the district is helping solve that issue or just supporting the initiative of implementing 1:1 devices in general. She said,

"the district influence has been huge." She stated, " the district has been working hard to adapt and meet the needs for a lot of things that they did not foresee taking place." She said, "things such as monitoring the devices of students and how they are using them, being able to monitor groups as student works together online, and the students playing games instead of participating in the lesson." She said that the district had been very responsive and trying to help teachers; an example of this was that teachers were complaining about a site called Cool Math Games, and the district had responded by blocking access to that site for students. She said the biggest thing that she feels the district is still working on, and needs to work though, is device management from the teacher level. She indicated that the district added two additional staff to her building to help with the instructional technology training for her building. These technology personnel help not only her teachers and students but also her administrative team with different applications and different uses for the devices.

She said, "the district has really worked hard to try to keep the training current and relevant as the adoption has progressed." She mentioned the two employees that worked at the district's central office with instructional technology were "incredibly valuable in this process." She also said that the district had purchased and expanded the use of Discovery Education software online. She said that through the training she has received on this software, it has really opened her eyes "to the potential that this software and what it allows for instruction and to the great resources it provides" her teachers. She said, "through the training received at the district level [she] was able to bring that information back with an example lesson to share with [her] administrative team." She indicated that she also then went to visit with different content areas in her building to

help implement Discovery Education into their curriculum. She stated, "the district hasn't really communicated very well with those specific content areas through the district content area specialists to help support teachers use of the Discovery Education software." She said that when she showed teachers the possibilities of what the Discovery Education software could do, they were very excited, and it really helped move their lessons along in a more technologically focused manner.

She said she was excited for the opportunities and enhancements technology was providing for her students. I asked if she could expand on that a little bit and be more specific. She immediately referenced textbooks being one of the benefits with the new devices. She said

> due to budgetary concerns and issues from the state level, textbooks were often behind the times and not current. With the implementation of the Chromebooks into the school, teachers were able to grab content from the internet and allow it to be filtered through the learning management system to the students.

She said, "in essence teachers are creating their own resources versus teaching directly from a textbook. The ability for students to visualize what was taking place on their own device is very positive for instruction." She said that students had a "more level playing field" as they all had access to the same exact device and software. Students' ability to turn in assignments and projects through the learning management system also helped considerably, from her perspective. She saw multiple benefits from the use of Canvas, saying that it cut down significantly on lost work and misplaced student assignments. She said that it also "allowed students to turn in work at any time whether they are sick, on vacation, or just didn't complete the assignment during class."

The principal shared that part of the growth in implementing the new devices that is taking place in her building, has been heavily contributed to the 8th grade teachers. She shared the eighth grade teachers had the devices last year in a pilot program and have been able to provide tips and professional development to the sixth and seventh grade teachers. She also discussed that her leadership team had just recently met and were developing a professional development session that allowed for differentiation in the level of learning for each teacher. She said that they were working on leveling different trainings that teachers could choose to attend facilitating them to learn new skills and deepen their knowledge of the devices and learning management system. She indicated that, overall, her teachers are much more comfortable with the devices and technology in their classes than they were at the beginning of the school year due to the training they had implemented this year.

I asked her if the teachers were all adopting it equally, or if she saw different levels of technology implementation in classes. She shared that teachers definitely implemented it differently. She stated "some teachers fully digitize their lessons and the learning is engaging and creative using the new tools as a foundation." Conversely, she stated "there are other teachers that are resistant." I asked her what she meant by "resistant," and she explained that "those staff members were not against the new technology," it was just that "they didn't go past the basic uses of turning in assignments and giving assessments to students through the devices." She estimated that about 25% of her staff were reluctant to use the devices. She shared that the teachers she encountered that were most resistant were the English classes. She stated, "those teachers are so used to handling paper and having students write out their thoughts in that way, that the

challenge to use the new technology has been a bit of a struggle." She says that even for that 25% of her staff that are reluctant to use the devices, there has been huge growth from the first day of school until now.

When asked what challenges she had experienced this year, she responded, "the kids being so smart and so focused on trying to circumvent the limitations the district places on the devices has caused a bit of an issue." She said, "students are constantly looking for ways to get their personal music on their Chromebook, their personal videos on their Chromebook, and play games on their Chromebook." Another issue they encountered also included shared documents that students thought would go away after being deleted. These documents were actually shared repeatedly and had inappropriate discussion topics and or statements in them, triggering the Gaggle software to notify them. She said, "recently I have seen a significant increase in the use of students emailing. For a long time during the school year students hardly ever used their email or even checked their email provided by the district." She explained that, as shared documents had been restricted and as filters had been increased, students moved to email as the primary form of communicating. She also shared her concern that the devices the students were provided were not as durable as they had initially anticipated. She said that they were seeing quite a bit of breakage in the devices, causing downtime because students were unable to use that device in class.

I asked her what other challenges, if any, she may have either heard of or challenges that took place outside of her building across the district. She said that the biggest thing she had been hearing, and experienced herself, was students trying to access inappropriate websites or materials online when they were at home on their own wireless

network. She stated, "there has almost been an overuse of the devices when students are home." She hears most from parents their concern with the ability to keep their students off their school Chromebook. She said that multiple parents had discussed the challenge of keeping students away from the internet when all of their school instruction was done through the internet.

I asked her how she was addressing all of these challenges with students attempting to circumvent the network filter. She said that the district had software called Gaggle that searched through all email and student documents stored in the cloud. She said that this software would flag anything from an inappropriate word, to an inappropriate picture, or even suicidal thought. She said following a violation, students would receive an email from the system notifying them what they had done and why it violated the user agreement for students. She shared if the violation was severe enough, that she would receive a notification. I asked what she meant by "severe enough." She explained that if students were engaging in things like sending nude pictures of themselves or making suicidal comments, the software and company monitoring the software would immediately call and notify her, the police, and additional district staff. I asked her how many notifications she receives and how she responds to them. She said when students receive their first warning, as an administrator, she doesn't respond to those or she "would never get to doing anything else." She is notified that the student is made aware of the violation, but she allows that first violation, if not severe, to be a warning. She generally only responds after the second or third notification when she assigns student consequences for those actions. I asked if she could share an example of

the consequences a student could receive. She said consequences could range from after school detention to loss of their device for a time.

I asked her what recommendations she has for the implementation of mobile devices, if any. She said that she recommends that implementation to be done as a gradual process. She shared, "during the initial pilot year for the eighth grade students which was last year, [they] tried to get as many extra Chromebooks as possible to help put Chromebooks in the hands of as many students in sixth and seventh grade as possible." She was concerned that students not having any interaction with those devices prior to getting one in their hands and essentially moving all of their learning to a digital format, would cause significant delays in instruction. The school was able to purchase two carts of Chromebooks, and they were consistently checked out by teaching staff in the sixth and seventh grades. She explained this was very helpful because she needed teacher leaders to help her train and adapt the new hardware and software to what they were already doing at their school. During this process, many of her teachers that she would consider "frontrunners in technology implementation" were helping other teachers learn, and they were also sharing the positives and benefits from using the new devices. This process naturally exposed the sixth grade team of teachers as being very reluctant to embrace the devices. Due to this training and access to mobile devices coming prior to the full implementation of the one-to-one program, she was able to train more heavily in the sixth grade teacher area to help support their implementation of the devices with more success. She said that she felt that this plan of providing additional devices outside of the pilot program allowed her school to quickly embrace the one-to-one initiative this year. It

also allowed them to move forward much more quickly than would have been possible had they not done this type of program.

I asked the principal if she had anything she would like to add that was important for me in researching this topic. She said that they anticipated that their students would be much more "techie in using the devices and creating documents with Google," but they really were not. Students struggled to create any document that was based on an instructional purpose for class. Students were much more interested in movies and music that relate to their personal interest. She said that she felt that this was due to the fact that "[students] mainly used smartphones" and not other mobile devices because the district didn't have enough devices for students to use as frequently as their cell phones. She said this caused a learning curve for students to realize that they "can use technology to 'create versus consume.'"

She also mentioned that next school year, they were going to ensure that they gave students basic level training to understand the purpose of the devices. She felt the purpose of devices "weren't super clear in the way that it was communicated [from the district]. Part of that was our school's fault, and part of that was maybe just the district moving so quickly due to community expectations." They had hoped to develop some sort of curriculum for using the learning management system, Canvas, Chromebooks, and the Google Suite of applications for education. I asked her if the district had created any of those documents or were helping with designing the curriculum. She said they had many resources available through websites and different online drives from the district level, but there was not any personal teaching or interaction available. She could call and schedule to have someone come out, but the help they received was not to work with

students regarding how the students could use the devices in the way she thought they really needed.

She appeared excited about being able to develop this curriculum for her school that she felt would help all of the students and staff start out more on the "same page." I asked what she meant by the "same page." She said that teachers are generally more experienced in using email, creating digital documents, and creating spreadsheets or PowerPoints and that "students really didn't have a ton of experience" as they had previously assumed. Getting students on "the same page" in terms of understanding the resources available to them would allow everyone to move forward faster because this year's implementation had slowed down the instruction in classes.

Group II Themes. Through the three different interviews at Middle School #2, a theme emerged that the group felt there was a lack of training for students on the use of the devices and the accompanying software. The principal shared,

> We assumed that the students would know how to use the Chromebooks and how
> to create work through Google due to their use of personal cell phones. This
> wasn't the case. Students were confused on how to use the new technology.

All Group II participants agreed that their goal was to teach students how to use technology effectively. The group felt that the district had not provided a clear set of expectations for student use of devices in classes.

Additionally, Group II mentioned the feeling that there were not clear expectations for the fidelity of the implementation in classes. Teacher 2b felt the district was "flying by the seat of their pants" to make the implementation work. She desired "a

plan; something to follow that is consistent and clear for everyone involved." The principal echoed her thought, mentioning that her school had "a strong PLC culture" that was helping provide some consistency. She was concerned that students experienced vastly different expectations for the use of devises from class to class.

Group II also shared a theme that the training for teachers needed to be designed to meet the level of mastery of the teacher. Teacher 2b felt her colleagues who were struggling wanted her "to create digital lessons for them or to just copy" what she had spent a significant amount of time developing and not learn the technology itself. She desired the district to provide her with time to create lessons to share in lieu of specific trainings. Teacher 2a said that she needed more than just the basic instruction she received when she was provided a Chromebook. She mentioned that some of her colleagues felt the same way and were "just making it up as they go along."

The final theme that emerged for Group II was in the preparation they did prior to implementation. The Principal shared how the school had worked with parents and community members to purchase carts of devices in advance and get those devices into the hands of her "front runners." The teachers mentioned that other staff in different grade levels such as sixth and seventh grade, had adjusted better than what they knew of other teachers across the district. The teachers mentioned that the school had begun technology integration training for all staff early in preparation for the full rollout of the new technology.

Group III: Middle School #3.

This group was comprised of two eighth grade teachers, Teacher 3a and Teacher 3b, that teach different content areas and the head principal of the school, Principal 3, participating in the mobile device implementation.

Teacher 3a. Teacher 3A is in her first year of teaching and her first year at middle school number three. She currently teaches science and math to eighth grade students. I arrived in her classroom as the principal had walked me from the front office to her room. It was during the teacher's planning time, and she was sitting at her desk working on her computer. The classroom was quiet, calm, and lit with lamps with the main lights off. The principal introduced me and left. The teacher and I engaged in some casual conversation as we met each other and then sat down at her desk to conduct the interview. I went over the interview protocol and paperwork with her. She signed the paperwork, and we moved into the interview.

I began by asking the teacher how they use mobile devices in their school. The teacher began describing the use of the new textbook for the math curriculum she teaches. She said that is called a "tech book," and it is largely based online. She also described briefly the use of Chromebooks and Canvas as tools they use to implement the devices in their classes. She then explained, in more depth, the math book, as she appeared very excited to share of the new resource. She explained that the new book had a very close tie to real life experiences for students. The text broke each lesson down into multiple parts that allowed the teacher to facilitate learning and instruction, while still allowing the student to find relevant applications to his/her own life. She also said that there were remedial sections to the online portion of the book that allowed students to go

back and relearn if there was a lack of understanding. She said, "these resources have been hugely impactful" in her ability to help students understand math.

I then asked her a follow-up question as she had already explained her role in utilizing mobile devices. I asked how she had integrated them into her classroom. She explained that they start class together, usually on an introductory assignment that she called a warm up, and then she jumped right into the day's lesson. She "had preassigned students sections of the book to work on" as she taught, and she was "able to instruct and facilitate in tandem to help students understand the math and the new concept better." She enjoyed the use of the devices because it let her meet each student "where they were in their understanding." I asked her if she could explain in more depth. She said,

> in the past when I student taught, it was just a regular math textbook. Often students would say that they understood or that they would get the right answer on their own work, but often they were taking it from their peers or from what [she] shared at the front of the class.

She said, "in this new method this year with the technology, students are able to work on their own and the online resources will tell the student if the answer is correct or not." She could see that information on her own device. She could then go around the room to help students work at a deeper level and ensure she answered their questions and that they understood "what was going on in class." I asked her what she does that may be different or similar in her science courses that she teaches. She said that most of her science course is lab-based, and they don't use the Chromebooks as frequently. She said that they use them for their assessments, and the students use them to create spreadsheets to collect data when they do their experiments. However this experience is not the same

because the textbook and the resources they use for teaching are not as digital as they are in the math course.

The teacher then described how she works with her teammates in eighth grade to help each other use the devices successfully. She said that they have been working on consistency in their classes to help students understand the expectations for using the devices. They often check with each other in an informal setting, such as a passing time, for technology help or to ask what are they are doing to solve a Chromebook problem. She said she has, "really enjoyed the collaborative nature of the devices because everyone, even veteran teachers, are asking questions together." She shared she feels as though [she's] a new teacher learning new things along with veterans. She also mentioned that this collaboration has actually helped her feel more steady as a brand new teacher.

I then asked how the district had influenced the implementation of this Chromebook initiative. She said, with a smile on her face and almost a little bit of a laugh, "the district moved the entire math curriculum online, essentially forcing us to use the devices." She explained that there had been intense training throughout the school year to help them use the new math textbook and the online resources. They had been placed in groups, or cohorts, to complete the training throughout the year. The math coordinator for the district had indicated that the training would be ongoing because it was purchased with the textbook for the district. She felt that, overall, the district had been "great." For example, she feels that the district makes sure that there are resources for her as a teacher, and training had been there from the very beginning. She feels very confident in doing what she needs to do to help her students learn math and science. She speculated out loud, wondering if it would be the same for teachers the following year

when the book was already in place for one full school year. She stated, "I hope the district has a plan for getting new teachers in the following years to the same place [she has grown]. She was sure that the district would have a plan because the "training had been so thorough this year" that she felt they would definitely support new teachers using this new online tech book.

I then asked how her building principal had influenced the implementation of the new devices. She explained that, when she refers to the district, she considers the principal as part of the district, and she had been very supportive. She said,

> she encourages teachers to use the devices in new ways and try new things. She is very responsive when there are questions or requests for new training, and [she felt] very supported by her and the other two assistant principals this school year.

She then indicated that the district had restricted student use of personal devices during school hours this year, and she saw that decision as very helpful. She said that in her student teaching, the students were on their personal devices constantly. It has been quite a battle for the mentor teacher that she had previously student-taught with. She indicated that, this year, the administrators had been very supportive in upholding the new policy from the district, and no students were allowed to use their own personal devices in the classroom. She also said that the students getting Chromebooks this year was still pretty new to them, and she thought this probably made it easier for the students to put their own devices away and use what they were given by the district.

I also asked her what opportunities the use of these mobile devices has provided to enhance the teaching and learning in her classroom. She opened up her personal Chromebook that the district had provided and began to show me how students could

answer questions. She would give them immediate feedback on their performance. She explained that this really enhanced her ability, as she had mentioned earlier, to differentiate instruction to "meet the students where they were." It also allowed her to check when they were working on homework outside of the school day. She named an example, during her planning time, when a student had been working in another class on homework and had missed a question. She said that she could see that the student was struggling, and looked up the student's schedule. She found the student in the other class and sat down with him/her for a minute to help with the work. She said, previously, this would not have been possible because technology had "really taken learning outside of the set class period." She said that the Chromebooks definitely changed the way students viewed their learning, and often, before practices for athletic events, they would work on their homework. If she was in the building and saw them message her, she could follow up to see what help they needed or send tips on their work.

I then asked her what opportunities the use of these devices had provided for the enhancement of teaching and learning in the building. She said she really did not know because she was not here last school year. I explained further that I really just wanted her perspective on this year since she had been at this school. She thought for a moment and said that a lot of what someone would see in the building related to her own personal experience in the classroom. She indicated that teachers were able to give students feedback much more quickly, and they were able to communicate with their students outside of the school day through the district provided email and devices. Then she shared "being a first-year teacher" she really did not know the building very well and felt that she was not able to expand on everything taking place. She had the perception that

what she was doing in her classroom was happening in most of her colleagues'

classrooms as well.

I asked her what challenges she experienced regarding the use of mobile devices,

and before I even finished the question she said, "oh my goodness, Cool Math games

online has been hugely disruptive." She said that the title of that website is misleading.

Students would try to argue with her and say that they "were doing a math game, but

really all they were doing is driving some car on an online hill that had nothing to do with

anything math related." She also stated, "the students are very technologically savvy."

For example, they could email each other or communicate through the use of a shared

Google doc. This often caused students to be off task and made it difficult as a teacher to

manage the classroom. As a teacher, she could not see what was happening on those

students' devices without walking up to the device to view the screen. The majority of the

time when she walked up, would close the tab on their internet browser or simply switch

to a different program on their device. She also mentioned that students were very

technologically savvy in understanding coding. They would often go into a website that

they were supposed to be working in and "somehow tweak the code and have it do

something entirely different." I asked her what she meant, and she said "there would be

silly things such as the color of a website screen or a document, and the students just go

in and personalize it." She said, "although this isn't inherently bad, over time, when the

150 students [she sees] every day, it takes a lot of time from instruction."

I then asked her what challenges others in the building may have experienced

regarding the implementation of mobile devices. She shared when she was in elementary

school, by the time she had reached the fourth grade there were computers in every

classroom. She said that she grew up with technology integrated into her learning as a student before she ever graduated high school. She said that there were "other teachers in [this] building who didn't get their first computer until they were actually teaching." She felt this caused some fear and hesitancy for those teachers. She stated, they are "willing to email, use the gradebook software, and even grade things online, but truly digitizing their teaching was a challenge." She felt "a lot of those veteran teachers didn't have technology growing up often just took the worksheet they would do in class and put it online." She didn't believe that this was truly the intent behind the new devices the district had implemented. I asked if she thought the veteran teachers, that did not have experience with technology, were getting more familiar through the year. She felt, although some of them were, from her perspective, many of them would complain about the technology as a way to justify their use of paper pencil assignments in class.

I asked her how she had addressed the challenges of students being off task or playing games when she was trying to teach. She said that she would warn students and then actually take their device from them. She said, "the devices allow such a collaborative environment that I could pair them up so that the student who couldn't seem to resist the desire to play games, ending up without their device during the hour, could be partnered with someone who hadn't gotten in trouble." She indicated that this strategy worked a little bit, but she had consistently communicated with her students that they had to be on task and that she was not afraid to take their device from them for the hour to ensure they were paying attention. She said, "the students really didn't like their Chromebooks being taken away from them." Even though they could work with a partner and still complete the assignment, the students were so connected already to their own

Chromebook that they did not like sharing with others. She said the use of Chromebooks has been a positive motivator for them to be on task. One of the other challenges she has to address frequently is when students tell her they have not charged their Chromebook overnight. This has caused her to have to make paper copies of assignments that were digital and has somewhat doubled her work. She also said that her team of teachers had bonded together to address the challenges they were having implementing new devices. The collaboration was something she enjoyed because teachers talk together about how to solve the problems of students being distracted or not being on task. Strong relationships had been built even though she was new to the building.

I then asked what suggestions she would have for successful implementation of the use of mobile devices in classrooms or in the building overall. She said that she hoped the district would offer some classes or trainings that were more geared toward advanced users. The training she had been to for the district, often started out with "here's what wireless internet is and how you connect." She then said "I would always roll my eyes and be like 'take me out of this place.'" She had desired there to be the ability for someone like her, who is very familiar with technology, to learn more of the advanced things to help improve instruction in her room. She felt that it was a waste of the district's resources to do some of the initial training she had been through. I asked what she meant by a waste of resources. She said that the initial training for Chromebooks was "basically how to turn it on and open it and log in." The district had paid her to go to this training, and she really did not need it. She indicated that it would be nice to be able to skip ahead or skip out of those type of courses and "go into something more advanced."

When she went to the first training for the new math textbook, she did not have access to the book making it difficult for her to follow along. She wished the district would have given her access to the book when she was hired so that she could have spent the summer becoming familiar with it. She indicated that, if she would have had the summer to just look through the new book, it was user intuitive, and she would have probably understood how to use it prior to the training. "Or," she said, "at least been familiar with the different resources prior to the training." She also said that the implementation of the new textbook was not thought out regarding how it would begin on the first days of school. The trainer and the math content specialist for the district had instructed teachers to begin lessons on the first day of school. However, she believed starting on the first day was not possible because students did not have their devices on the first day of school, and there was no way to access the book unless they had a device. She stated, "this caused everyone to have to adjust their lessons and adjust the schedule so that they could make sure they stayed caught up on the pacing calendar." She also said she was not sure if access to the materials was in the district's control. She wondered aloud, because it was a new book, if there was a problem with the way that they were bought in the timeline for them to have access. She stated, "it would be very nice to have more time to just explore the resources." She said, "there are trainings at the site level and district level, but they're often isn't just time to sit and just play with and explore the new technology."

I asked her if she had anything else that she would want to add as we had reached the end of our interview. She said that she had been doing some research online and that there was a service online titled Untangled that allowed parents to monitor their

children's activity online on a device at home. This company had been developing software for education that would allow teachers to have students log in to that site and then have access to their devices. She said the biggest hold back this year had been the inability to actually view what the students are doing on their screen. She felt this was something that held students back and allowed them to stay distracted. She ended by saying, "it has been so awesome to have the students being able to work at their own pace in class." She said, "I am so thankful to work in a district that was willing to implement these devices and resources," and even though it was not perfect, she felt that she was very supported and her district was a very wonderful place to work.

Following my interview with teacher 3A, I stayed in her class to observe her next hour. She stood at the door and greeted students as they entered, pointing to the assignment on the board for them to begin. Students came in and sat down at desks that were set into groups of four facing each other, two facing two. The classroom lights were off, and there were lamps on in the room, and there were two windows opposite of the entry door to the classroom that allowed light in as well. The Smartboard was on, and the assignment was posted there. When the class started, the teacher came back into the room closing her door and gave students directions to reinforce what was expected from their warm-up assignment.

The teacher walked around the room as students had their Chromebooks open and were working on the warm-up assignment. After a brief time as the teacher was walking, students were closing the lid to their Chromebook. After most of them had their lid to the Chromebook closed, the teacher then said it was time to review the warm-up assignment. She asked students questions about the assignment they had done, and they shared what

they had written on their devices in what appeared to be a journal that they had maintained. Following this activity, the teacher then directed them to the math lesson for the day and instructed them to go to the math textbook online. The lesson appeared to be a review from something they had learned the day before as the teacher mentioned that they had covered the material yesterday. The students were then instructed to work on their own and raise their hand if they needed help. The teacher then walked by and explained to me that the students were working in groups together online to complete an assignment. Students were working through math problems on what looked to be an interactive lesson online. Students were on task, and the room was generally quiet as students were working. The teacher continued to walk around. When students would raise their hand, she would go over and kneel down next to them to answer questions. At one point, she actually regathered the class's attention to the Smartboard where she pulled up the textbook online and demonstrated how to work a problem and find a solution. She then gave the students directions to continue working. Throughout the time, the students seemed engaged on what they were doing, and about half of the students using paper as scratch paper to work out problems as they tried to answer the questions. There were 30 students in class. The classroom was full, and there were only two empty seats in the class.

Teacher 3b. Teacher 3B met me in the front office of the school for our scheduled interview. This teacher was very friendly and shook my hand asking me to follow her down to her classroom. We engaged in casual conversation discussing who we may know in common, how long she been at the school, what she loved about the school, and how her year was going. We arrived at her classroom, and she asked me how we

should sit for the interview. I asked her what was comfortable for her, and she directed

me toward her desk. I asked her if I could move a student desk over next to her desk, and

she said "absolutely." I sat down and explained to her my research and the consent form.

She signed the form, and we began our interview.

I began the interview by asking the teacher how long she had been in her current

position and what her current position was. She explained to me that this was her fourth

year at Middle School Number Three and that she taught English to eighth grade

students. I then asked the teacher to describe the use of mobile devices in her school. The

teacher asked what I meant by "mobile devices," and I clarified by explaining that I was

referring to devices provided by the district, not student personal devices. She then stated

that the district had implemented the use of Chromebooks into their school over the last

two years. Last year, the students in eighth grade had been given devices, and they had all

been learning together regarding how to use them. This was her second year to use the

devices, and her students' first year as they did not have devices last year.

She then immediately began describing her role of utilizing the mobile devices.

She said that she was "really trying to be open to using the devices," but she "wasn't

super comfortable with them when the year had started." Last year, when they had

initially used the devices, she had used them a little bit, but she did not feel as if she had

enough training or understanding on how to use the Chromebooks or Canvas, the learning

management system. She said that, this year, she had been using the devices more and

that she felt "more ahead of her students." Her English students did most of their writing

in Google Docs. She said that she would create templates or assignments and put them

into Canvas for students to then open on their own Google account so they could begin

writing. She indicated that this plan had been a bit of a challenge, as some students, she felt, actually needed paper and pencil to help them write better during the year. I asked her if she could explain what she meant in more depth.

In the past, when she had taught students how to write, she had broken down the writing process into smaller portions. She said that they started with a main topic or thesis, and then she would have them write introductory sentences or bits of information on three by five note cards. Following that step, students would work on organizing those cards into what she called "coherent thoughts." She shared she would have students write their rough outline from the cards, and then she would meet with them to talk about their outline. She would have the students begin to write a rough draft, and then they would peer review their rough draft to write the final draft online. She indicated that she was struggling to adapt the new writing style to use the devices more. She felt pressured to use the devices because "the district had spent so much time and money on getting them into the hands of the kids." However, she felt "some students did better on the paper pencil method," and she often continued to use that method even when she was trying to adapt the process to the new online models.

In a positive way, she enjoyed the ability for students to work collaboratively online through their devices. She said that she could assign a Google Doc to a student group, and they could all be working on the same document at the same time, something the students desired to do. She would give students choices about different ways to share regarding a book that they had been reading or a piece of literature they had reviewed, and students would often choose collaborative projects. She indicated that collaborative work also helped cut down her grading because she then did not have to spend all of the

time individually grading 150 plus students' work every day. She had lessened her grading load by organizing students into group work to grade.

I asked how she worked with others in the building to support the new mobile device integration. She said that she had worked with her PLC partner to try to create some lessons over the summer, and coming into the school year, those had worked generally well. She described her PLC partner as "much more technologically savvy" than she was, and indicated that her partner often helped her implement new things in her classroom. They had also been working as a grade level to help with "all the distractions the new devices had created for students." She mentioned that the district had restricted students' cell phones this year, and the restriction had helped significantly. She said what they were working on now was "keeping students off of gaming websites or just emailing back and forth or using a Google Doc to talk back and forth." I asked if she could expand on what she meant, and she explained that, in the same way she could assign students to groups to work on the same document for a class project, students could create their own documents and invite whomever they desired to share on the document. These documents would get shared broadly, and students would be writing notes to each other during class. She laughed and said it was "really the 21st century way of passing notes in middle school" like she had done as a student on paper.

I then asked her how the district had influenced the implementation of this initiative. She said that they had provided training regarding how to use the Chromebook that she found to be "pretty helpful as I really didn't know what a Chromebook was before getting one." She indicated that the district had tried to move to digital online textbooks. This year, the district even bought a math textbook that was entirely online

[from what her colleagues had told her]. Additionally she indicated that the district had

sent out surveys because they had experienced some problems with getting students

online. There had been times when the Wi-Fi had "kicked students off" during this school

year. She said that she felt the district was trying to help, but they seemed to be a little bit

overwhelmed with everything that was happening with all of the students using

Chromebooks.

I asked how her building administrators had influenced the implementation of this

initiative. She told me that her building administrator was very supportive. Her principal

often tried to have other teachers that were very confident in their use of the devices

demonstrate new ways to use them or just share how they were using them in class during

staff meetings or other professional development days. She stated that her principal "was

not very pushy on using the devices." She appreciated her administrator's approach and

felt that it took the pressure off of her to try to use the technology in ways she was not

comfortable with, yet. She also mentioned a conversation she had with her principal. She

said that the principal shared with her that she "hadn't really received that much training"

and really felt as if the staff and students were far ahead of her knowledge. The district

had provided basic trainings for the teaching staff, but not for the administrators.

I asked the teacher what opportunities the use of these mobile devices had

provided to enhance teaching and learning in her classroom. She stated again that she

enjoyed the ability for students to collaborate together on projects, and she indicated that

the new devices had been beneficial because students could no longer claim that they had

turned their work in or that she had lost it. I asked if she could explain what she meant.

She said that all of the work was turned in digitally through Canvas, the learning

management system. Students would upload the documents from their Google drive into Canvas or work on assignments in Canvas itself where the students' work was always saved. She liked the ability to not have to "shuffle paper." However, she again reiterated that she "struggled with instructing in this way" because she felt "writing really needed to have that kinesthetic approach of paper and pencil." She also said that she, at her PLC partner's encouragement, had begun emailing students directly in the last few weeks.

She was concerned that students had not been frequently checking their email until recently, and as they started she would be exchanging email with them. She said that at the this point, the number of emails that she was receiving was currently manageable. Students would email her, and she would get a notification on her personal cell phone. She would then respond to them "pretty much any time she was awake." I asked if she felt this might become unmanageable at some point. She said that it was possible and that she could see that happening. She enjoyed students asking her questions outside of class because, to her, it meant they were thinking about what they had learned that day and reflecting on it or trying to do their homework.

I then asked what opportunities the use of mobile devices provided to enhance learning and teaching in the entire building. She said that the Math teachers that were on her same team seemed to enjoy the new math tech book. She said that the Chromebooks had "really focused the team of teachers" that she worked with. She felt very positive because "everyone was working with the same resources in the same direction." She stated, "the Chromebooks are still pretty novel to the students, and they are really engaged to use them and excited about them as they were still so new."

I then asked her what challenges she had experienced regarding the use of mobile devices. I had not even finished my question when she interrupted with, "oh, there are a bunch." She said that students were often not doing what they were supposed to be doing on the Chromebooks. She said that they would "open up their web browser and have multiple tabs running at the same time messaging with each other or playing video games online instead of doing their work." The district had not given her the ability to see what was on her students' Chromebook screens, so she had difficulty monitoring what they were doing. She felt she could just "walk holes in the carpet in her classroom trying to get around to everyone's screen to make sure they were on task." She also mentioned that, in the beginning of the year, there were many times that they were "kicked offline." She indicated that the district had addressed this issue, but "it was super frustrating [for her] when they were not able to use the online lesson." She said that she was already "a little hesitant to use the devices fully," and having students kicked off made it harder for her to want to engage.

This teacher also said it was challenging when students would forget to charge their Chromebooks, and they would come to class without a device that was working. The building had a rule that students were not allowed to charge their Chromebooks at school, and she indicated that sometimes, she would just break the rule and let students plug-in their Chromebook so they could work. She stated that sometimes it was difficult to give a test when the internet would not work or if a student did not have a Chromebook. She said this "doubled her workload" because she "would have to create paper versions of the same digital assessment or assignment for students." She said this was very frustrating for her.

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I asked her what challenges others had experienced regarding the use of mobile devices, and she said that her colleagues had experienced much of the same problems she has experienced. One of the math teachers she had talked to had experienced some issues "keeping up and really using the math textbook." She said that wireless internet connectivity had been an issue, and she mentioned that students were getting in trouble often through a filtering software the district had installed that checked all of their writing. She said, "if students write something inappropriate or upload a picture into their Google account, the administrators get notified." She felt monitoring student activity on their Chromebooks was causing the administrators to be unduly burdened with following up on what she called "silly middle school behavior."

I asked her how she had addressed all of these challenges. She said that she and her teammates had tried to be consistent in the expectations they set for the students use of devices. They had all gotten to the point where they had students close their Chromebooks when they were giving instructions so that they knew students were paying attention. She said that they had asked the district to block the Cool Math games website as this seemed to be the most frequently visited site her students used to play games during class. She felt that the district had been working to help address the challenges with connectivity and students getting kicked offline. She expressed appreciation that the district would send out surveys and try to ask what the teachers thought when trying to solve problems. She stated, "we are just experiencing growing pains as we try something new."

I asked what suggestions she would have for a successful implementation of the use of mobile devices either in another class or building. Before I finished, she chuckled

a little bit and said, "give teachers a choice as to whether or not they actually want to use them before you implement them." She then said, "no, I'm just kidding. I think they are good for students to have." She said that she "really wished that they were able to see what the students were doing on their screens" to help her monitor students' work and engagement. She also said that she "wished that there was more time to just plan lessons and work with the devices versus actual structured professional development given by the school or the district." She stated, "on top of entering grades, taking attendance, grading work and planning lessons, that there really wasn't any additional time added to the day to just practice or create digital lessons."

She suggested that the district give teachers actual time to "just sit together and work on creating lessons that would be used in these classes." She indicated that lack of planning time held her back from using the devices and caused her to use more paper and pencil because that is what she "knew worked." She then mentioned that it would have been helpful for the students to have more training or for teachers to have more guidance regarding how to train students to use the devices. She said that the district, "didn't really have a plan for how to train students in that it had kind of been just dumped on the teachers' laps to teach students how to use the devices."
She said that teaching students to use the device took a large amount of time, estimating it to be "around two to three weeks" before students were familiar enough with the technology to use it in class well.

I then asked her if there was anything else she wanted to add as we had completed the formal interview questions. She said, "I know the use of the devices and getting them into students' hands is important to help prepare them for the future." She said it was

"just hard to be in the beginning stages and trying to figure out how to adapt" the way she teaches to meet the new technology expectations. She explained that sometimes she felt "like technology was more important than the actual content" she was hired to teach. She said that this was probably just her, but that she wishes that there would have been more direction in terms of creating content and supporting the curriculum in English so that she could have been more successful in implementing this year.

Following the interview, I stayed with the teacher as she began her next class period. I moved a chair and sat in the back corner near the teacher's desk as she went to the door to welcome her students to class. Her classroom was decorated with posters of famous authors and quotes from those famous authors. On the dry erase board near the front of the room next to the Smartboard, she had a question for students to respond to in their journals as a warm-up. The desks were set into groups of four with two facing two. The classroom lights were on, and there was no window and no natural light. The teacher was friendly as she greeted her students, and they came in and opened up their Chromebooks and seemed very talkative as class began. The teacher had to step into the room two times to ask the students to "begin the bell work" while she was waiting for other students to enter class for class time to begin.

When class began, the teacher restated the question that was on the board and asked if any students wanted to share what they wrote. Students raised their hands, and the teacher called on them as they briefly shared what they had written in their Chromebooks. I observed other students' Chromebooks from where I was sitting. Two of them were playing computer games, and others were browsing the internet on a website that did not appear to be focused on what the teacher was discussing. As the teacher

walked from the front of the room back toward her desk where I was sitting, students

clicked out of websites that they were on. The teacher then asked the students to go into

their Google account and open up the document they had been working on. She went next

to me and explained the students had been working on a small writing project that they

were continuing during this class period. She instructed them to get out any notes they

needed and to begin working and completing that assignment. She explained that she was

going to be walking around the room to sit down and discuss their writing with them.

There was a bit of casual conversation with the students as she collected her Chromebook

and begin walking around the room, and they slowly began to work. During the entire

class there was a slight bit of student conversation taking place in the background.

The teacher stopped at the first student nearest to her desk, knelt down next to

him, opened up her Chromebook, and began discussing that student's writing. Other

students continued to work. Some of them had paper note cards, and others were simply

just using their devices. I noticed some students were browsing on the internet. As the

teacher moved around the room to different areas of the room, students would

occasionally raise their hand or ask to use the restroom. At one point, a student in the area

of the room that was opposite of where the teacher was working with another student,

appeared to have his head down and was not working. The teacher got up, went over and

put her hand on the back of that student and said, "hey, it's time to sit up and begin

working." The teacher then spent the next few minutes working with that student to get

him started. Other students around the room began to talk, and the teacher had to ask

everyone to be quiet and refocus. Following her instructions, the room got quiet, and the

students seemed to all be working. The teacher continued to move around the room

meeting with students individually and discussing their work. Toward the end of my observation time, the teacher stood up and walked past me, opened her Chromebook and clicked through a bit of what the students had been writing to show me how they were working. She pointed out the ability for students to actually build a works cited page using the Chrome extension that was in their browser. She said that this feature had actually been one of the positive aspects of using mobile devices because it was often a challenge for students to cite their work. She then thanked me for coming and went back to helping the next student.

Principal 3. I met the principal in the front office after having scheduled a time for us to conduct our interview. I waited in the office for approximately 15 minutes while the principal was in a meeting. The front office was calm with students coming and going and parents picking up their students. The secretary at the front counter greeted me very warmly and made sure that the principal knew I was waiting. When the principal was done with her meeting, she stepped out of her office, looked over toward the front, and saw me. She greeted me and asked me to come back to visit with her. We went into her office and sat down at a table and engaged in some casual conversation about how her day was going. I then explained why I was interviewing her and what my research was about. We went over the interview process and the consent form. We then began our interview.

I began by asking her how long she had been in this position and about her current title. She told me that this was her second year as the principal of Middle School Three and that she had been an administrator for 17 years total. I then asked her to describe the use of mobile devices in her school. She said that every student in the building had a

Chromebook and that they were to use them for every class. She felt eighth grade teachers were using them better as an instructional tool than sixth or seventh grade because eighth grade teachers had the devices the year prior. She said that the eighth grade teachers had figured out how to use the devices and that they had "made the use more fluid and integrated into classes." She explained that the students take Chromebooks from class to class, and that is how they access their textbooks. She said that some classes had class sets of books, but she explained that, generally, the teachers would ask students to access textbooks online. In terms of using the learning management system, Canvas, her sixth and seventh grade teachers were, as she had mentioned before, further behind.

I asked her, in regard to that answer, about the number or percentage of teachers in her building that were using the devices all of the time for all of the lessons versus teachers who were not using them at all. She replied, "I would say all the time, 10% of my staff. Put it under your desk and never use it, I don't feel that we have any teachers doing that anymore." She said, "the least amount that is used in a classroom is probably two days a week." She stated,

> that wouldn't necessarily mean that during those two days they were using it from
> the beginning of the hour to the end of the hour, but at least the devices were
> being used as the main tool for two class periods with the majority of time being
> on the devices per week.

I then asked the principal her role and the utilization of mobile devices. She said that she does not want to and will not dictate a minimum expectation for the use of devices in the classroom. She said she wanted her "teachers to feel comfortable and be

well trained before the expectation was students implementing or using the devices every day all day." She explained that it is taking time for teachers to build lessons into Canvas. She said,

> I have not even sat down with teachers to ask them how much they're using it because I really feel like if they are engaging students in our curriculum, whether they use the devices or not, that is what we are after anyway.

She often hears people talk about the benefits of using the technology at least once in every professional development opportunity. She stated "we will have teachers get up and share with other teachers how they're using the devices and the learning management system and how this benefits them to give teachers ideas and build confidence in using the technology." She said as the leader of the building, she is not at the point where she "feels like they're not using them enough" and that she needs "to mandate a specific amount of use." She felt her role was to support teachers and expose them to different training so that they could build their own comfort in using the technology. She indicated that, if she is in a classroom doing a walk-through and sees a teacher doing something innovative or very creative using the technology, she will ask the teacher if he/she would be willing to share their practices at a staff meeting.

I then asked her how she has seen the mobile devices integrated into the classroom. She said that she sees "lots of research, lots of Google docs, lots of collaborative work taking place." She indicated that their iPad cart is, surprisingly, checked out all of the time because of how much easier it is to create videos using iMovie versus using anything provided with the Chromebooks the district gave them. She said

that she sees "the devices used mostly for note-taking, quizzes and tests, research and accessing the online textbooks."

I then asked how she had worked with others or how teachers work with others in supporting the mobile device integration. She responded,

> For new teachers this year, the learning curve had been very steep especially for those teachers teaching eighth grade that were new to the building this year. They were far behind the other teachers that had been there the year previous during the pilot.

She indicated that experienced teachers had to become the main resource for new teachers that were being on-boarded. Now, when they were placing mentor teachers with brand new teachers to the building, she "not only had to consider that teacher's academic skill for instruction, but their technology skill [as well]." She stated, "the implementation has even influenced the interviewing process" as she hires new staff. She said she "had interviewed and even hired teachers that really did not use technology in their instruction previously before joining the school." She described the decision as,

> "[those decision] has actually been a very big issue this year as those teachers were very resistant as new employees to use the technology because they'd always done it without technology and felt that it worked fine and that they didn't need to use the Chromebooks.

She said that there was a teacher that said to her, "I've been doing it this way for 20 years and it works great. Why do I have to change and do something different when I know that this help students learn at a high-level?"

I then asked her how the district had influenced this implementation. She said the impact was mostly through training provided by the district. She said that it was, "honestly hard for me to be a leader in this because I don't use Canvas." She said that her teachers had the opportunity to attend training over the summer, and they were paid extra to learn ahead of time to use the devices. She said "there really wasn't a lot of training offered to administrators," and she indicated that she was not very familiar with the use of the learning management system that the district was using. She said that parents would ask her questions or would have questions about the way teachers were utilizing Canvas, and she really could not answer them. She even had a child of her own in the district using the Canvas software on Chromebooks, and even from the parent side, she felt that she really did not understand all of the things she needed to know about Canvas. She also mentioned that the district had brought new personnel to her site to help support the implementation. Tt had been very helpful to have a technology specialist come to the building every morning to help with any issues they were having. She also said that she,

> wished that the district would help in identifying maybe five to ten teachers that were experts in the technology in the building. Telling everyone that these are your people to refer to when you need help with Canvas or the Chromebooks.

She said that she would like to see those five to ten teachers in her building trained, beyond what regular teachers received .to help them go beyond what the minimum expectation was to move the use of the devices forward.

I then asked what opportunities the use of mobile devices had provided to enhance teaching and learning in her building. She said, "the main thing it has brought is the availability for students to collaborate at a deeper level." She said that the availability

of online materials and research materials had made her school's library almost become "obsolete." She indicated that her library had become, "more like Starbucks now, than what the library has always been thought of in the past." I asked what she meant, and she said that students generally went in the school library "to hang out or have quiet space to work." Students were often working on their devices or reading casually, and "they weren't often engaged and checking out books for research or learning, but simply using the library for a place to hang out that was casual and relaxing." She then continued explaining how students being able to research on their own through the internet was very helpful. She also stressed that the new math textbook had been incredibly helpful and allowed teachers to provide immediate feedback on math assignments. She felt this feedback was "very valuable to quality middle level instruction." She also mentioned that the assessments used through Canvas were much more valuable and helped teachers collect data much more quickly on student performance versus grading them by hand. I asked her what challenges she had experienced with this implementation of mobile devices. She said, "with the adults, the teachers that have [teaching] experience prior to joining the staff at our school and have had success in that previous experience, have been very hesitant to use the technology in their classes."

She said that the challenges for students, specifically sixth graders, was "just bringing the devices every day and having them charged and ready to use." For all students, one of the challenges has been the personal communication that they do with one another that has been flagged by the district filter system called Gaggle. She said, "students are flagged all of the time for things ranging from inappropriate language or images to comments about self-harm." She said that the administrators would get

notifications three to four times a day of these violations. She also said, "we've had incidents where students have been able to access pornography through their school provided device." Her site had only experienced a few of these incidents, but she felt "one was far too many." She said, referring to students caught accessing inappropriate material, it was not a conversation she ever enjoyed having with parents. In those conversations, parents would often share that they had put safeguards in place for the personal devices they provided their children. However, parents felt that the district was handing the students a device with the ability to access inappropriate materials at home. I asked her how students were accessing inappropriate materials on the school provided devices and if they were circumventing the district filter. She said that she did not think that that was necessarily the case because the district could monitor when students were trying to circumvent the internet filter, iBoss. She said, "really it comes down to the students being clever and working around the systems in place, finding loopholes that were previously unknown to access inappropriate material."

I asked her what challenges others in the district had experienced that she may be aware of through the implementation of the mobile devices. She said the challenge that she was most aware of from other administrators in the district, were the alerts from the Gaggle software. She said student monitoring had become somewhat of an issue. Students had begun emailing each other inappropriately, and the district was working to block students from emailing each other to only allow emails from students to staff and staff to students versus student-to-student email. She said occasionally they have connectivity issues with the devices, but that "it was very, very rare and usually only for a few moments, and then they were back online."

This principal indicated that teachers had been complaining to her and others in the district that the devices were a bit of a distraction because students devices could not be locked down unless they were taking a test. She said that many students were online playing games or communicating back and forth through documents or email, or "just surfing the internet and websites" that were not related to the content in class. She had given all of her math teachers iPads this year. With the iPads, the math teachers could mirror what the iPad screen was doing to the front of the room and work problems for students while moving around to keep an eye on students' screens. This modification to math teacher instruction ensured students were engaged in the correct material for the lesson. She said the district had implemented a policy where students were not allowed to have their personal cell phones out during the school day, and this policy has been very helpful. However, she felt that the Chromebooks had taken the place of cell phones as a distracting tool.

I then asked, in terms of addressing the challenges of seeing student screens, if she or others in the district had addressed this concern with the district. She said they had "mentioned multiple times the need for teachers to be able to monitor student screens" and that the conversation had "really gone nowhere." She was not sure if the district was resistant due to cost or a lack of the technology available to do what they requested. She said other ways they had been addressing the distractions was to create consistent expectations in the classroom. They had "created a callback for students to know that when they hear that call back phrase, it's time to close their Chromebooks." This callback allowed teachers to focus on providing instruction without distraction. She said some

teachers had their students turn their Chromebook screens around while they were

teaching, so that they could see what was going on their screens at the same time.

One of the challenges they were still working through was the volume of Gaggle alerts,

caused when students violated the network filter or expectations. She said, "in every

meeting we have had this year with other administrators, someone has brought up the

volume of Gaggle alerts they were having to handle and deal with on a daily basis."

She said she "hates Gaggle alerts, but loves them at the same time." She explained

further, "[i] love that Gaggle was catching things," but the volume that the filter is

catching was "overwhelming the administrative team to be able to handle issues

thoroughly." She also mentioned students had found the ability to create online petitions,

and although initially they had started out in a pure attempt to change dress code or use of

cell phones during the day, it had become a problem. She said that multiple students were

creating multiple petitions that would automatically email those that they would add to

the petition list. Tthere was a point where she was getting dozens of emails per day from

students trying to solicit her support of their petition.

I then asked her what suggestions she would have for successful implementation

of mobile devices in other places outside of her school or district. She said she felt the

biggest "short-sighted move" that the district had made was in parent training. She felt

that parents in the district were ready for technology and open to the progressive nature

of using devices in classes. However, they really did not understand Canvas and were

never taught how to use and understand Canvas from the parent side, including how to

work with their students when there were issues on homework. She stated,

in the past before there were devices, parents could open up the book with their student and sit down and do the work with them. Now, most of the assignments are assigned through Canvas, and students' textbooks are also online. Parents feel restricted in being able to support their student at home to complete the work assigned.

The district had done several large trainings centralized at the district offices, but that very few parents attended. She said at her school they had done specific training for parents and had a much larger turnout. She felt the district needed to host and provide trainings at all of the sites individually because parents were more likely to attend those than an overall district training. She also felt, in those trainings, it would be important to communicate at a deeper level with parents regarding the filtering systems in place and the use of the Gaggle software "to help support students to stay in bounds and not have access to an appropriate materials."

I then asked the principal if she had anything she would like to add. She felt that she had been "saying a lot of negative things," but that she "truly doesn't feel that way about Chromebooks." She said it has "been a very positive thing" and that she sees "a lot of benefits to students using these devices every day." She feels "the district is doing a better job now of preparing students for the future than they have previously by implementing the devices." She said mobile devices also "helped teachers start to learn again." She explained by stating, "the technology placed a demand on teachers to really try new things and use the technology because everyone has access at this point." This new learing allowed her staff to move forward instructionally with important conversations that probably would not have taken place if devices has not been handed

out. She said that the implementation was "really a work in progress" and that they were "really trying to support it to grow naturally, and not force it" at her school. In spite of the challenges, she felt they were seeing success in this approach. Teachers in the beginning of the year who had been resistant generally had moved further forward and were using the devices more frequently. She again reiterated some of the staff she had hired with previous experience in other districts without technology, were "still pretty resistant to using technology," and she was "worried about their success as a teacher" in her building moving forward.

She said moving forward she "really hoped" the district would focus more supports and onboarding new teachers into the district. Brand new teachers, or even teachers that had taught for a long time without technology, need additional support on top of just basic classroom management and instructional methods as they moved to a new school building. She said, "for this to be successful as an implementation, the district will have to continue to adapt and grow training to best fit each individual person, versus just a blanket training that people receive to help them get started."

In summary, she was very thankful for the devices and the support the district had provided, and she felt, moving forward, the implementation was going to improve and grow to become better for students and the instruction taking place in the district.

Group III Themes. Through the three different interviews at Middle School Three, a theme emerged that there was a need for differentiated training to better fit the level mastery with technology for the teachers. Principal 3 stressed that experienced teachers just joining the district had a difficult time embracing the implementation and needed different support than those already working in the district. She said,

or new teachers this year the learning curve had been very steep. Especially for

those teachers teaching eighth grade that were new to the building this year. They

were far behind the other teachers that had been there the year previous during the

pilot.

Teacher 3a felt that teachers were working together to teach themselves as the district did

not provide additional training beyond basic levels of use.

Group III also mentioned a concern with the devices being districting resulting in

teachers working collaboratively to solve the issue. It was mentioned by Teacher 3a, and

echoed by Teacher 3b, the implementation caused the teaching staff to work together

closely and communicate at deeper levels. Both teachers mentioned that the Principal was

supportive and did not force the implementation, but she was allowing teachers to help

shape what the use of the devices would be in their classes. This caused inconsistencies in

the implementation of the devices in classes.

The Principal indicated that she wanted the focus to be on instruction of the

content, not necessarily the tools used to instruct, She felt the technology would diffuse

naturally. In observing the teachers within this group, the use of the devices was not

consistent, and students had to adapt to different expectations. The teachers mentioned

that they had worked together to train students on how to use the devices and Canvas.

When asked if they had been provided any curriculum or guidance on training their

students to use the devices from the district, all of the participants of Group III shared

that had not and that they wished the district would create a student training.

Similarities Among Groups I, II, and III

In the different groups common themes emerged in three areas. The first commonality found in each of the groups was a desire for there to be teacher training on the implementation that was differentiated to meet the levels of teacher understanding. Participants identified that the innovation, and the uses of the innovation, were not implemented in ways that allowed users to learn beyond the initial training provided by the district. Teacher 1a said that she was allowed to attend the basic level training multiple times to help her gain a basic understanding of the innovation. As Teacher 2b shared, "some teachers are struggling to understand even the basics, and other teachers already knew the basics before attending the training. I needed more advanced training." Principal 1 mentioned, when asked how the teachers adopted the devices past the initial district trainings, "some teachers are very techie and digital forward, and they are implementing on their own and figuring out ways to solve problems and help others."

A second commonality was a lack of clear expectations by the district as to the fidelity of the innovation. The expectations were "inconsistent" or "changed over time" or were not communicated at all. Principal 2 mentioned, in regard to expectations that "the district hasn't really communicated very well with… specific content areas." Multiple participants mentioned differences in resources available for each content area, with some having access to the new math tech book and others not having access to online texts at all. Teacher 1b said, "my content area does not have a lot of district provided resources like other content areas." She had to go online to find those resources which caused a difference in the way she used the devices from those that had the necessary resources.

The final commonality found across all three groups was a lack of preparation to train their students in implementing the innovation. Principal 2 mentioned that teachers at her school anticipated their students would be much more "techie in using the devices and creating documents with Google." However, students were not familiar with the use of mobile devices, and they were working on their own to create a student training for next school year. Teacher 2b shared that, in the beginning of the year, she had to set aside her content and curriculum to teach the students how to use the devices and the software. She had to teach them how to use Canvas, the learning management system, and Chromebooks. Principal 1 said students lacked understanding on the purpose of the devices and were, instead, working to circumvent district filters and use them as they would a cellular phone. Referring to the lack of student training, he said, "students didn't fully understand the potential of their ability to communicate with one another."

Table 5

Similarities Among Groups I, II, and III

Areas	Similarities Among Groups I, II, and III
1.	Need for teacher training on the implementation that is differentiated.
2.	Clear implementation expectations across the district.
3.	Training for students to support teachers.

Differences Among Groups I, II, and III

One of the differences between the groups that emerged was the way in which they addressed the implementation of the innovation, specifically focusing on the training

teachers received at the school site level when the devices were introduced. Teacher 3a "really enjoyed the collaborative nature of the devices because everyone, even veteran teachers, are asking questions together." She shared she "feels as though [she is] a new teacher, learning new things, along with veterans." Conversely Teacher 1b, a more experienced teacher, said the school did not provide any formal training and that she had to attend the initial training for the use of Chromebooks and the learning management system multiple times and was still struggling to implement. Principal 2 said that she had trained in anticipation of the 1:1 implementation to help teachers be more prepared. Although Teacher 2b enjoyed that training, she said that the expectations for the implementation changed when the devices were implemented.

Another difference was in the perceived lack or abundance of resources. Teacher 1a, a math teacher, felt that the resources available to support the instruction taking place through the innovation was very helpful. She said, "my school provided a lot of extra resources for my content area." Teacher 2a said that the district had "taken away her textbooks and forced her to find materials online." She felt that the district and school had not provided her with any resources, negatively impacting her use of the innovation. Teacher 3b said that she had "limited resources" and that she had to adapt her "tried and true" teaching style to make the resources work within her classes.

The final difference was the way in which the principal addressed student distractions. All of the sites had a policy that restricted the use of student personal devices, but all three were different in how they addressed student engagement in the innovation. This finding seemed to be due to a lack of clear expectations from the district. Each principal had a different approach in addressing student engagement that ranged

from taking the Chromebook away from the students, to creating "call backs" to get students on task, or even not addressing the issue but petitioning the district to find a solution.

Table 6

Differences Among Groups I, II, and III

Areas	Differences Among Groups I, II, and III
1.	How the innovation was addressed for implementation.
2.	Perceived lack or abundance of resources by teachers.
3.	The way in which Principals address student engagement with innovation.

Summary

Chapter IV contained a narrative of the participants' responses and observations during the interview process. This chapter also identified themes that emerged and noted the similarities and differences within each group and across all of the participant groups. The participants' responses and observations addressed the perception they had of the implementation of the innovation. Through the observations and responses from participants along with the survey results, they addressed their role and the way in which the innovation was diffused within their group and in their classroom. The observations by the participants identified the innovation, the way in which the innovation had been communicated, the time in which the innovation had taken place, and the social system in which they interacted with the innovation. The coding method used of inductive and the

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process contained an initial coding, a line-by-line process of the transcribed interviews, a

categorization of the data and then defining themes that emerged.

CHAPTER V

FINDINGS AND CONCLUSIONS

The purpose of this qualitative case study is to understand administrator and teacher perceptions of their ability to effectively implement the use of mobile devices in a rapidly changing, high-stakes accountability environment at the middle-level. These findings provide important insight regarding this district's implementation of a district-wide 1:1 mobile device initiative.

I conducted single face-to-face interviews with each of the nine participants, followed by observations of the six participants that were classroom teachers. I also surveyed all of the eighth grade teachers involved in the implementation. The participants were from three different middle schools all within the same district and varied in teaching/administrative experience.

In this study, I use Rogers' *Diffusion of Innovation* to explain the findings. This theoretical framework describes diffusion as "the process by which an innovation is communicated through different channels over time among the members of a social system" (Rogers, 2003, p. 11). Rogers' (2003) theory identifies "innovation, communication channels, time, and the social network" as the four main elements of diffusion. As teachers and principals participating in a new implementation of a 1:1

mobile device initiative, they were involved in an innovation process. The communication channels were both formal and informal. The time was the current school year, and the social system was the site of each school, the teacher, principal and district itself. Using the framework as my lens, I organized the data to reflect the innovativeness of the adopters.

Research Questions

In conducting my research, I gathered information from a purposive sample within a bounded system for this case study. The survey, observations and nine interviews provided a large amount of data. Following coding, organization, and analysis of the data, I applied findings to answer the four research questions of this study.

The first research question was, *What are teachers' and administrators' perceptions about the challenges and opportunities that arise from integration of mobile devices in the learning environment?* This question addresses participants' perceptions of challenges and opportunities as the innovation was diffused.

Teacher and administrator perceptions varied from each other based on their view of the relative advantage of the innovation which influenced their rate of adoption in either a positive or negative way. Rogers (2003) discusses relative advantage of an innovation being "perceived as better than the idea it supersedes" (p. 265). All of the participants shared that the innovation itself was foundationally important to help prepare students for the future that would be much more technology involved. In this way, even those that were late majority and laggard adopters shared a common belief in the social system for the compatibility of the innovation as one that had a relative advantage.

Where teacher perceptions of challenges and opportunities begin to differ was the compatibility to their content area and their past instructional experiences. Those teachers that taught the math curriculum with the new textbook and online resources were in the early majority and innovator adopter categories. These teachers shared more opportunities that occurred with the implementation of mobile devices. With Teacher 1a and Teacher 3a both feeling that they were able to provide much more immediate feedback to students as they were working on the new instructional goal for the day. These teachers received deeper levels of training which helped to break down the complexity of the new implementation. The two math teachers and one of the foreign language teachers, containing two innovators and one early majority adopter category member, also sought out specific ways through trialability to utilize the technology for their students.

The two teachers that were identified as innovators, desired to be more isolated within the social system from their peers thus negatively influencing diffusion. They were focused on pushing the diffusion of the innovation and finding new ways to implement the mobile devices. They often did not feel visiting with others was helpful; instead, they viewed it as a hindrance. The math teacher and the three principals that were in the early majority felt that collaborating with peers was important and valued helping others use the technology in new ways. The social system of the middle school helps support the early majority adopters' positive influence on the rate of adoption. With middle school instruction taking place at these sites, groups of five teachers shared the same 150 students each day. This allowed for the teachers within the social structure to create

common language and common expectations for the use of the devices in the classrooms positively impacting diffusion.

The social system within the district also helped to positively influence the adoption. Those participants in the early majority and innovator adoptive categories agreed and felt that the technology being implemented aligned with the district mission to prepare students to succeed in a changing society. They felt that the district social system would benefit through the relative advantage of the diffusion in preparing student for their future after high school. Participants mentioned the responsiveness of the district in addressing issues they were experiencing. One of the participants felt that the superintendent was "very in tune with the needs of teachers in the classroom" and was communicating well on how the district was working to support the initiative and to address challenges they were experiencing. Participants differed in their view of the compatibility of the innovation to the social system. Those teachers in the late majority and laggard adopter categories felt the implementation of mobile devices negatively impacted their ability to provide quality instruction. They shared that the focus on technology was not one that would produce the results they could produce through doing it in the "paper and pencil" method. They felt that the time spent planning and adapting their lessons to fit within the innovation as time wasted that could be better spent working on what they "know works."

The second research question was, *What factors influence their ability to implement mobile devices into the middle-level learning environment?* There were multiple factors that influenced the ability to implement mobile devices for participants. Compatibility was the first factor that influenced the ability to implement mobile devices

for participants. Teachers on the higher end of the adopter categories felt that the innovation was consistent with existing values and met the needs that they had to prepare students for the future. Conversely, those at the lower end of the adopter category relied heavily on their past experience in teaching what they called an "analog method." These teachers shared that they were able to experience high levels of success without the innovation and that there was no need for the technology to help them meet the goals of preparing students for the future. Therefore, this perception negatively impacted the adoption because they did not see the value technology offered to their curricular area.

For administrators, their perceptions varied in terms of compatibility. Two of the administrators felt that the technology was compatible with all of the change initiatives that they were facing and that this technology should be a foundational piece of all of the parts of the social system of the middle school and the appropriate curriculum. These two administrators shared various ways in which they had attempted to blend the technology into current practice within their buildings. One of the administrators provided training prior to the adoption of the devices, and another often shared, through other staff members' use or their own experience, the positive advantages for the innovation within the current social system. One of the administrators, though, felt that the focus on the innovation was taking away from the existing value she held for the building to ensure high levels of instruction. This principal did not feel that the technology was compatible with the goals and vision she had for the building. This view by the administrator had a negative influence on the adoption. As a building leader, this principal has an important role in what Rogers (2003) calls being an opinion leader. This opinion leadership role has

a strong influence on the success of the diffusion process through influencing of attitudes and overt behaviors relating to the adoption of the innovation.

Complexity was another one of the key factors that influenced the implementation of the new devices. The district provided a basic level of initial teacher training to help address the complexity of the Chromebook, Google Apps for Education and learning management system, Canvas. For those that would be teaching math, the district provided additional training and resources through the adoption of the new math textbook. These teachers saw the complexity of the innovation as low due to the additional training and resources they were provided to help show a direct application for the use of technology in their curriculum. Those outside of the math content area and the administrators in the study had different views of the complexity of the innovation. Those teachers that were on the lower end of the adoptive categories did not understand the ways to use Canvas or the expectations from the district to use the new innovation as a whole. Additionally, all three administrators mentioned the lack of training and understanding on how to use Canvas and Chromebooks in the classroom. One of the administrators commented that he/she was not even able to assist parents with questions because he/she did not understand how to use a learning management system. This complexity was a hindrance to the administrators in providing additional support to those that were on the lower end of the adopter categorization.

A third factor that influenced the implementation was trialability. All of the teacher participants mentioned a desire for time to explore and experiment with the new technology. The teachers mentioned a lack of time to explore content-area resources and lack of time to understand how they would apply through the technology. This limitation

led to an uncertainty about their own ability to utilize technology in their classrooms. This lack of trialability negatively impacted the time in which the innovation was diffusing. Those teachers that were in the innovator adopter category, teachers 1a and 2a, both shared how they had spent personal time exploring and experimenting with the new innovation to find ways to implement it into their classroom. These teachers had adapted the innovation to fit the needs of their content area and had adopted the innovation much more rapidly.

As administrators were not provided with any substantial training or support, their lack of trialability negatively impacted the adoption of this innovation within their building sites. Due to an unfamiliarity with the innovation and a lack of time to experiment and understand the innovation that was being implemented, administrators were unable to fully support teachers in a way that would have increased the speed of the adoption.

Observability was a fourth factor that influenced participants ability to implement mobile devices. Teachers were unable to observe the positive impacts of the implementation due to the constraints of their schedules. Administrators attempted to address this deficit by having teachers that were successfully adopting the implementation of the devices in their classrooms share, during staff meetings, what they were doing to experience success. Observability positively impacted administrators' perceptions of the innovation and positively influenced their adopter category. Administrators' schedules and job requirements caused them to be in classrooms during instruction to observe teachers using the new technology in either successful or

unsuccessful methods. All three of the principals mentioned the positive impact of observability on their understanding of the uses of technology in their school buildings.

The last factor that influenced the ability to implement mobile devices by the participants was the social system. The main social system that the participants were in was the Middle School model and it had a positive impact on the adoption. The middle schools were based on a team model containing core teachers all sharing the same students throughout the day. Teams in these middle schools are physically placed near one another so that students are contained in the same area of the building. In all three school sites, participants mentioned the ability to discuss informally ways to address challenges or opportunities during passing times, before school, during planning times, and after school. This team concept promoted a highly collaborative environment within each building. The teachers and administrators within this social system were familiar with one another and felt comfortable asking for help in their team or across the grade level when they struggled to use the technology.

The social system also contained sub-domains of content professional learning communities (PLCs) that planned and created curriculum together. These PLCs are an expectation of the district and are an important part of the social structure. These PLC teams positively influenced the adoption of the innovation due to the expectation within each PLC that the same curriculum and assessments are utilized. The social system of PLCs also allowed PLC teams to support each other in like content areas, splitting the duties of creating and discovering resources for the content amongst the team.

The third research question was, *How do these teachers and administrators navigate the challenges they face to implement mobile devices?* There were multiple

similarities among the three schools and in the adopter category groups in answering this question.

The first way in which participants addressed challenges was within the social system. Teachers and administrators referred to a strong collaborative culture within their school sites and the district as a foundation for navigating challenges they were facing. Teachers in the group that struggled with the implementation of the devices generally sought out assistance from middle school team members or PLC partners to solve the challenges. These teachers would consult with colleagues and ask for assistance in using the devices or understanding their use when they felt they could not perform the basic tasks the learning management system required where those that were in the early majority mentioned that they would seek support much more frequently and in more areas than just answering basic questions.

Administrators would use the social system through the use of team meetings and staff meetings to provide opportunities to break down the complexity of the innovation. Administrators also relied heavily on the middle school teaming structure to positively impact the implementation. Administrators shared that they often saw teams working together to set common expectations for student use of devices which was positively impacting the complexity of device use.

Some teachers mentioned a lack of understanding and that the innovation's complexity was a challenge. These teachers shared that they were using students to help solve their implementation challenges. These teachers utilized students to solve their problems for implementation, such as having students create an online poll without trying it beforehand, and then the teachers learned those skills to benefit other students within

their classes. The use of students may be a reflection of the desire for teachers to progress in the innovation, and it may suggest that these teachers saw the relative advantage of the innovation. However, it also could be interpreted as a survival tactic for those teachers who felt especially challenged by the innovation. One possible consequence of the use of students as "teachers of the classroom teacher" could also, potentially, result in a change in classroom dynamics as students perceive that they "know more than" their teachers. This finding deserves additional consideration as teachers strive for effective classroom management, and roles begin to become less defined.

All of the teachers except the two innovators relied on district trainings that were provided at a basic level to help them address the complexity issues of the mobile device implementation. The two innovator teachers felt that the trainings were a poor use of their time and that that only needed time on their own to explore the trialability of the mobile devices and adopt the new technology. The two late majority and the one laggard teacher involved in the study attended the initial trainings from the district multiple times to help them address the complexity of the innovation. These teachers struggled with the lack of resources and felt that understanding the devices and their use would better direct their instructional practices. Both administrators and teachers mentioned that the district had hired new personnel that spent a portion of the morning each day at their school to address any challenges the school was experiencing. Participants could seek out these new staff members to solve challenges or problems within the innovation.

The level of innovativeness within the teacher and administrator and the manner in which they were progressing in the adoption had a direct influence on their ability to navigate challenges they faced. Those on the higher end of the adopter categories often

solved problems and navigated challenges on their own without much assistance from others. Those in the late majority and laggard areas of the adopter categories often waited for others to solve problems for them, depended upon students, or let the challenge persist until a solution was given to them. They often did not seek out solutions or help from others. Those at the higher end of the adoption category scale would often seek out those at the bottom to help them navigate challenges. Those in the early adopter and early majority sections of the adopter categories felt that the innovation could diffuse in a much more rapid manner if all of the teachers on their team, or in their content area, were consistent in their implementation. Therefore, these teachers would seek out struggling colleagues and assist them as much as possible. Administrators often relied on these same teachers to help them navigate the challenges they were facing. The principals mentioned that they would observe teachers that were implementing the devices successfully and solving a specific challenge they were aware of, and they would ask that teacher to train others within the building to help them overcome those challenges.

The fourth and final research question was, *How do these teachers and administrators synthesize current change initiatives in the implementation process?* The participant's view was heavily influenced by their level of innovativeness. Participants of the study had two distinct methods in which they synthesized the current change initiative.

The majority of the participants believed in the relative advantage of the innovation being woven into all of the current initiatives they were addressing. They did not look at the implementation of mobile devices as a separate change initiative, but instead, they viewed it as a foundation in which all other change initiatives were to be

based upon believing that this innovation would provide a better way forward. This systemic shift in viewing the technology initiative as having a positive impact on all change initiatives caused these participants to adopt the technology earlier than others.

The minority of participants felt there was not a relative advantage in this innovation and that the implementation "was happening to them" and that they "did not have a voice" in how it was being implemented. Those that shared this view were teachers, two in the late majority and one in the laggard category. These teachers synthesized the change initiative as another additional task for them to complete, and this perception caused them to veer toward preventative innovations. Rogers (2003) defines preventative innovations as "new ideas that an individual adopts now in order to lower the probability of some unwanted future event" (p. 267-268). These teachers prioritized the technology innovation as a change initiative that was a low priority, yet they did not want to be viewed negatively by peers or their administration. As a result, these teachers sought methods to minimally adopt the innovation. This group felt that their focus needed to be more on the instruction of the curriculum and content then focusing on how to implement the devices.

Those teachers and all of the administrators in the higher levels of innovativeness synthesize current change initiatives as woven together with the technology implementation. Rogers (2003) discusses the s-shaped curve of adoption and normality. He states that "the S-shaped adopter distribution rises slowly at first when there are only a few adopters in each time period. Then accelerating to a maximum until half the individuals in the system have adopted" (Rogers, 2003, p.272). In the breakdown of the teaching participants and the administrator participants, all of the principals were in the

adopter early majority category and 50% of the teachers were in the early majority and innovator sections of implementing the new devices. These levels positively impacted the diffusion of the innovation as these participants were able to synthesize change initiatives as a combined whole and not as individual initiatives that each required different resources.

Teachers and administrators also synthesized current change initiatives through various means of communication. Administrators communicated how the innovation interacted with other change initiatives and what the expectation was for teachers to diffuse the Innovation within their building. Teachers communicated challenges due to complexity and a lack of trialability with administrators and the district causing additional supports to be put in place to support a more rapid adoption. Teachers communicated strongly with each other as shared by participants. Teachers were able to discuss complexity, relative advantage, trialability and the compatibility of the innovation within their content area and team frequently. This communication positively impacted the diffusion of the innovation as it allowed participants to rely on the social system to solve challenges and provide opportunities for the use of the devices.

Conclusions

One conclusion of this study is that *the relative advantage of the mobile devices was not clearly communicated to the participants and negatively impacted the adoption*. One of the teachers felt that the implementation "was happening to them" and that they "did not have a voice in the process." This is one example of how the district failed to communicate the relative advantages of the new innovation. The participants felt that it

would have been helpful to know what the district goal was before implementation. Teachers shared a desire to have a voice in the process of implementing the devices and learning management software before being told it was happening. Had the district taken time to survey staff and share the relative advantage of the innovation teacher buy in would have been larger. Another example is the principals' lack of training to support the implementation of the mobile devices. All three principals in this study mentioned the lack of understanding of the learning management system and its uses within the classroom to support the implementation. Teachers and principals had very different roles regarding the implementation of this innovation. Teachers were responsible for reporting grades on the new learning management system and for transferring their instructional materials and pedagogy to online formats. In contrast, principals were primarily responsible for student behavior offenses that resulted from inappropriate use of the devices. These two conflicting roles added tremendous workloads to each group. Teachers who did not have aligned curriculum were primarily burdened due to the fact that they had to search for their content and adapt classroom practices to meet academic goals. Principals and teachers shared that they had little say in the implementation process and that the district had directed it from that level. The principal of Middle School #2 provided training prior to the implementation of the devices by the district and felt that he/she had more teachers familiar with the new technology and provided reason to view the mobile devices as a relative advantage. Teacher and administrative input regarding how the innovation would influence their daily practices could possibly have supported the diffusion of this innovation.

The impact of perceived relative advantage took place naturally in teachers that were earlier in their careers. These teachers adopted the innovation more quickly than those later in their teaching career due to their perception that the innovation had a positive impact on instruction and productivity. Some of the experienced teachers struggled with adapting or changing what they felt was their entire instructional method to meet the new change due to unclear benefits of innovating. These teachers did not feel that the new mobile devices superseded their ability to provide high-quality instruction through "a paper and pencil method." These teachers also felt a loss in productivity due to challenges with the perceived complexity of adopting the innovation. A change in pedagogy seemed to challenge the validity of previous teaching practices for these veteran teachers. It is possible that allowing veteran teachers to experiment with the innovation and creatively apply their teaching expertise may have served to promote the diffusion of this innovation in this district.

Another conclusion of this study is *when implementing the devices the district needed to continually adjust the way they addressed the complexity for participants.* They also needed to provide observability and trialability time for those that were new to the innovation to allow them to see the relative advantage of the technology and experiment with the new technology in their context. Teachers reported varying levels of diffusion based on their understanding of the new technology, with teachers that had previous experience with technology being more receptive to implementing due to a deeper understanding of the uses of the mobile devices.

In this study it was evident that throughout the diffusion process, teachers felt that attention should have been given to monitoring the participants perceived feeling of the

innovation's complexity. All of the teachers mentioned a desire for time to experiment with the new innovation, which Rogers (2003) calls trialability. This time for trialability would allow participants to experiment and discover relative advantages of the new innovation being implemented. Principals attempted to positively influence the diffusion of the innovation through observability practices. Principals observed a teacher utilizing the mobile devices in a successful way in their classroom and would then ask him/her to share their uses in front of the entire faculty. This practice positively impacted the diffusion as other teachers were able to observe positive advantages of the new innovation.

Following the sharing of the relative advantages of the new innovation in an effort to gain teacher buy in and influence opinion leaders, teachers expressed a need for initial trainings to take place to address the complexity perception of the innovation and set up a foundation of knowledge creating a baseline for growth. The training for principals was also identified as a need in this district. Principals actually had two roles: monitoring the use of the innovation in classrooms and monitoring student activity on the devices. Principals with a lack of training in the late majority or laggard end of the adopter scale negatively impacted the diffusion of the innovation being adopted. When implementing the innovation, participants indicated that the district needed further trainings need to fit to each participant's level of innovativeness. According to Rogers' (2003) theory of diffusion, communicating frequently with participants within the implementation allows for the social system to provide training that aligns with the innovativeness and would better prepare participants for successful implementation of the new initiative. Participants that had been in the district previous to the implementation of mobile devices

versus those that have just joined the district this year exhibited less resistance to the innovation and sought different training from new staff. Experienced teachers that were new to the district or school site often felt they lacked training and experience when implementing devices into their classrooms. Some teachers mentioned that the district offered additional training to address their difficulties, but they stated that it was only available outside of their contract time. Overall, participants shared that, as they progressed through the school year and the complexity lessened, their adoption increased.

Finally, the social system of the school and the district had a positive influence on teacher and administrator perceptions of their ability to diffuse the innovation. The middle school structure of teaming facilitated predetermined teams that worked together to address and solve challenges. Teachers were able to support each other in the diffusion and positively impact the innovativeness of other participants. Teachers and administrators worked together to create common language and expectations for students, and they worked within PLC teams to create common content with the technology provided. This social system supported the transition from traditional instructional practices to the use of mobile devices in the middle school classrooms.

The district worked with school sites as a part of the social system to solve problems that were faced during the implementation, providing initial training and additional personnel at the school campuses in the morning to provide additional support. Participants generally viewed the district as a resource in their social system to address challenges they would experience and implementing mobile devices. Administrators were able to direct their resources and work with smaller teams within the grade levels to

support the diffusion process resulting in a positive perception of their ability to implement the new devices.

Implications

Findings from this study identified the need to address the relative advantages of an innovation to positively influence the perception of teachers' and principals' ability to implement that innovation. In light of the data collected in this study, the following implications apply for implementing a new innovation into a middle-level learning environment. While findings in qualitative research are not generalizable, some of these implications may be transferable to other school sites and organizations with similar contexts.

District leaders. Multiple participants in the study expressed confusion as to what the district expectations were for the implementation of the new devices and saw a lack of the advantages of implementation. Teachers in this study expressed the need for the district to provide clear expectations and implement varying supports to ensure the fidelity of the implementation. With significant time and financial resources involved in the implementation of mobile devices, clear goals and benchmarks may have allowed not only a higher success rate of implementation, but a more rapid diffusion of the innovation being adopted.

Participants felt that training was very basic and did not adapt to meet their understanding level. Teachers suggested that the district consider surveying the innovativeness of their participants and create tiered levels of training to match what is represented in their survey. Additionally, resources provided for math teachers reflected much more success of the innovation implementation in those classrooms versus those

teachers that were not a part of the new textbook adoption. Findings from this study suggest that diffusion may have been more successful if resources for all content areas were more consistent. Teachers without previously prepared instructional materials were responsible for finding content on their own. This lack of consistent resources seemed to inhibit the innovation's success and the adoption overall.

School leaders. School leaders have a strong impact on the success of a new innovation. School leaders can assist with diffusion of innovation if they help their sites prioritize change initiatives and identify resources to help the staff of their school adapt to these challenges (Rogers, 2003). Some participants reported little to no involvement in the initiative from the principal level where others felt their school leader was positively impacting the adoption. Specific examples of the supports provided by school leaders include, additional professional development provided by teaching peers, forwarding of new technology information and additional resources found online, and a lack of pressure to implement the devices more quickly than teachers felt comfortable. School leaders have a clear understanding of goals and expectations for their school in relation to any new initiative. Frequent visits to classrooms and formal and informal methods of communication may have helped school leaders assess the needs at their site in relation to the innovation's overall goals. Understanding the goals and expectations of a new initiative allows school leaders to provide additional support and resources to teaching staff helping them adapt to the new change.

Findings in this study also suggest the need for additional training for administrators to help them better understand the new innovations. All of the administrative participants of the study mentioned a lack of training and support at their

level to help them understand and explain the new technology implementation. These findings suggest that it is important for school leaders to communicate with district leaders the needs for training and support so that they, in turn, can pass those resources on to their staff, students, and parents. Additionally, school leaders may need to communicate frequently with district leaders as to their understanding of the implementation of mobile devices.

Teachers. Teacher participants in this study frequently referred to high levels of collaboration within their school and grade-level teams. Those teachers that felt more comfortable with the use of mobile devices often supported those teachers that were struggling with the implementation. Through the observations and interviews conducted in this study and the data produced, there appeared to be a need for teachers comfortable and successful in implementing mobile devices to support those that are struggling. This support could be accomplished through shared professional development during staff meetings or other formal professional development opportunities. It could also be accomplished through informal conversations and questions asked during the instructional day.

Conversely, those teachers who are struggling with the use of mobile devices and implementing them in their classroom could also seek out those teachers and district personnel that can support them in their growth. With support from colleagues, teachers that struggle with implementing devices can make small incremental changes to their instruction to help them better adopt a new innovation. In relying on colleagues to help support their own implementation, they could potentially increase the network of support they have available and adopt the new devices more quickly.

Theory. This study applied Rogers' Diffusion of Innovation theory to technology integration. The application of this theory helped to understand teachers' and administrators' developmental levels in regard to technology innovation. The theory was my major classification system, a priori. I used the theory prescriptively throughout my research as my primary lens from beginning to end. With the importance of matching pedagogy to prepare students for future careers, understanding challenges to the implementation process becomes even more important. Identifying positive and negative influences on the diffusion process provides understanding in how to adopt and implement new innovations with fidelity and success. The application of this theory also spoke to the influence of the middle school structure on the diffusion of an innovation.

Recommendations for Future Research

The purpose of this study was to understand administrator and teacher perceptions of their ability to effectively implement the use of mobile devices in a middle-level classroom.   Educational leaders involved in the implementation of a new innovation, may use the information provided in this study to better understand the diffusion of technology implementation. Continued research may prove helpful in the following areas:

1. Additional understandings could be developed by comparing the innovativeness of district leaders, technology leaders, site administrators and teachers over the implementation of a new innovation. Research in this area may provide information on how participant's adoption category changes over time.

2. Research is needed regarding how training impacts diffusion of an innovation. Research in this area may provide information on how different training impacts the speed in which an innovation diffuses through a social system.

3. Further research is needed regarding diffusion of an innovation in relation to teacher experience levels. Research in this area may provide information on how teacher experience impacts technology diffusion.

4. Research in socio-economic impact diffusion may provide information on how socioeconomic status influences the implementation of an innovation.

5. This study provides a platform for further studies regarding whether the middle level is the appropriate level to implement mobile devices. Research in this area may provide information on the influence of the middle level student development on the diffusion process. Because students at the middle level are experiencing tremendous social, emotional, and physical changes, introducing technological innovation at these grade levels may or may not promote optimal learning. Additional research is needed to understand the influence of technology innovation on learning at the elementary, middle and high school levels.

6. Further research could be useful regarding how incentives influence the diffusion of an innovation. Research in this area may provide information on the positive or negative influence of incentivizing the diffusion process.

Limitations

The study has multiple limitations. The first limitation is the small sample size. Qualitative research typically includes much smaller samples than quantitative research, and only having nine interviewed participants and 24 other teachers surveyed precludes

generalizability. However, context in qualitative work is extremely important, and districts with similar characteristics may find some of these findings useful in implementation strategies. Survey responses could also be a limitation. Only 48% of those surveyed responded. Had there been a higher response rate, the information gathered may have been more reliable. Another limitation is the method of data collection through interviews. This approach and methodology has two limitations: the participants' views are the only perspectives analyzed in the case study, and interviewing may influence the actions and answers of the participants. Also, the use of a priori approach could be a limitation due to the limited scope of observation. The use of the theoretical framework is also a limitation as it provided a narrow focus. An additional limitation is that this study relied on participants to volunteer for this study. The fact that participants volunteered could reflect that they were more comfortable in a social setting or more comfortable with the challenges they were experiencing with technology implementation.

This study examined administrators' and teachers' perceptions regarding their ability to implement the use of mobile devices in the middle-level. In this study, I collected data from teachers and administrators at different school sites in the same district.

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APPENDICES

Appendix A

Oklahoma State University Institutional Review Board

Date: 11/02/2018

Application Number: ED-18-141

Proposal Title: THE IMPLEMENTATION OF MOBILE DEVICES IN THE MIDDLE-LEVEL CLASSROOM ENVIRONMENT

Principal Investigator: Cordell Ehrich

Co-Investigator(s):

Faculty Adviser: Kathy Curry

Project Coordinator:

Research Assistant(s):

Processed as: Exempt

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 223 Scott Hall (phone: 405-744-3377, irb@okstate.edu).

Sincerely,

Oklahoma State University IRB

Mobile Learning Adoption Scale Survey

Q1 Please select the best choice.

○ I do not have much knowledge about mobile learning. I usually see learning applications on mobile devices in people around me. (1)

○ I think the use of mobile devices in the educational process is beneficial. I am conducting research regarding learning via mobile devices. (2)

○ I will learn the knowledge I need in the future using opportunities provided by mobile devices. (3)

○ I learn the knowledge I need using mobile drives. I use mobile devices in educational activities. (4)

○ I have realized that learning through mobile devices is beneficial for me. I think mobile devices can be used effectively in educational activities. (5)

Q2 Please select the best choice.

○ I used mobile learning applications under influence of people in authority. Social pressure was effective in my decision to use mobile learning applications. I obtained

information about the educational uses of mobile devices due to demand by an authority (directors or people in authority). (1)

○ Since important people around me used the mobile devices, I used these devices for the purpose of learning. My friends using mobil devices encouraged me to use these devices in education. My family supported my using mobile devices for educational purposes. (2)

○ Learning the knowledge I need using mobile devices was entirely of my own accord. (3)

Q3 Please select the best choice.

○ I am one of the last to use mobile learning applications in my environment/ I have not yet used a mobile device to learn new information. (1)

○ In the learning process, I started to use the mobile devices much later than many other people around me. (2)

○ I was not one of the first to use mobile devices in the learning process but I used them earlier than others around me. (3)

○ When mobile devices were becoming widespread around me, I was one of the first to learn the knowledge I needed using mobile devices. (4)

○ I began to use mobile learning applications when those around me did not have any information about these applications and there were not enough mobile devices around. (5)

Q4 Specify whether you agree with the following statements or not. 1= I totally disagree and 7 = I totally agree.	I totally disagree (1)	Click to write Scale point 2 (2)	Click to write Scale point 3 (3)	Click to write Scale point 4 (4)	Click to write Scale point 5 (5)	Click to write Scale point 6 (6)	I totally agree (7)
1. Learning through mobile technologies increases my efficiency. (1)	○	○	○	○	○	○	○
2. I find mobile learning beneficial. (2)	○	○	○	○	○	○	○
3. Mobile learning increases the quality of what I do. (3)	○	○	○	○	○	○	○
4. Use of mobile devices contributes to my career. (4)	○	○	○	○	○	○	○

5. Use of mobile devices is compatible with my traditional teaching methods. (5)	○	○	○	○	○	○	○
6. Use of mobile devices is compatible with my learning preferences. (6)	○	○	○	○	○	○	○
7. I possess the knowledge required to use the mobile learning method. (7)	○	○	○	○	○	○	○
8. I use mobile learning effectively with my existing knowledge. (8)	○	○	○	○	○	○	○
9. I possess adequate means to try mobile technologies in the educational process. (9)	○	○	○	○	○	○	○

10. I can access mobile learning applications any time I like. (10)	○	○	○	○	○	○	○
11. I first try a mobile learning application and then I use it. (11)	○	○	○	○	○	○	○
12. It is difficult for me to use mobile learning applications. (12)	○	○	○	○	○	○	○
13. It is easy for me to use mobile learning applications. (13)	○	○	○	○	○	○	○
14. It is easy for me to access information I need via mobile devices. (14)	○	○	○	○	○	○	○
15. I can observe that use of mobile devices for educational purposes benefits those around me. (15)	○	○	○	○	○	○	○

16. I can tell others about the benefits of mobile learning. (16)	○	○	○	○	○	○	○
17. I share with those around me the applications about the educational uses of mobile devices. (17)	○	○	○	○	○	○	○
18. Those around me help each other in regard to mobile learning applications. (18)	○	○	○	○	○	○	○

End of Block: Mobile Learning Addition Attributes

Appendix C

Interview Protocol (Teacher and Administrator)

1. What is your current position and how long have you been in this position?

2. Please describe the use of mobile devices in your school.

3. Please describe your roll in utilizing mobile devices.

4. How have you integrated mobile devices into your classroom?

5. How do you work with others in the building to support mobile device implementation?

6. How has the district influenced the implementation of this initiative?

7. How has your building administrator influenced the implementation of this initiative?

8. What opportunities has the use of provided for the enhancement of teaching and learning in your classroom?

9. What opportunities has the use of mobile devices provided for the enhancement of teaching and learning in your building?

10. What challenges have you experienced regarding the use of mobile devices?

11. What challenges have others experienced regarding the use of mobile devices?

12. How have you addressed these challenges?

13. What suggestions do you have for the successful implementation of mobile devices in your (classroom or building)?

14. Is there anything else you would like to add?

VITA

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Candidate for the Degree of

Doctor of Education

Thesis: THE IMPLEMENTATION OF MOBILE DEVICES IN THE MIDDLE-LEVEL CLASSROOM ENVIRONMENT

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