TEACHER ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN A ONE-TO-ONE

MOBILE DEVICE MIDDLE-SCHOOL CLASSROOM

by

Gary L. Mosley

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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APPROVED BY:

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ABSTRACT

As the classroom climate transforms into a more technology-enhanced environment with increased device availability, there is a growing need to understand how attitudes among teachers may be influenced by the use of these devices in the classroom. Because of current technology trends, device integration is essential to meet education goals (Keengwe, Schnellert, & Mills, 2012). Research suggests that the use of mobile devices in the classroom along with the expectations for teachers to integrate these devices into their curriculum can have significant effects on attitudes and behaviors among teachers and therefore, should be studied (Sahin et al., 2017; Moore, 2016; Beeland, 2002; Christensen, 2002). This study attempted to examine the difference in teacher attitudes toward technology integration based on their use of either Chromebooks or iPads as mobile devices in a one-to-one integrated middle-school classroom. Using a quantitative, causal comparative design, participants were selected from a population of middle-school teachers at two Southeastern United States school districts. The sample size of participants was 115, of which 73 used Chromebooks and 42 used iPads. Data were analyzed using an independent-samples t-test to examine the relationship between attitude and mobile device used. Results of the survey showed that no significant difference existed in the attitude scores of teachers' and the mobile device they used. Although the study did not find significance in the attitude scores, the data indicated that attitudes were mostly positive. Further research should be conducted to include a broader population, other grade levels, and other mobile devices. Studies that look at variables such as self-efficacy, training, and confidence, along with attitude should be researched.

Keywords: technology acceptance model, theory of reasoned action, attitude, one-to-one device initiative, technology integration, mobile technology.

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Dedication

I would like to dedicate this work to my wife, Martha. You have been a constant support to me during this journey. Through your consistent prayers, guidance, and patience, you often helped me stay focused and on task during each milestone. Having you by my side made me believe that I could be successful. Thank you for understanding when classwork and writing seemed to interfere with our life and our family activities. Thank you for prodding me to stay engaged at times and for reminding me of my goals along the way. You are an inspiration to me, and I am very thankful that we completed this journey as a team.

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I would also like to give credit to each of my professors. They taught me how to think more deeply and consider ideas in various ways and through various lenses. They also helped me learn to integrate my faith into my studies and into my classrooms.

Another person that I would like to acknowledge is my mother-in-law, Billie Faye Harvey. She has been my professional proofreader and editor throughout my degree program and especially during my dissertation process. Her guidance helped me improve my writing skills over the past several years.

I also realize that a journey this big would not be possible without the support of my family and friends. They have been encouragers and cheerleaders since the beginning. I am thankful to everyone that supported me, helped me, prayed for me, and believed in me during this amazing journey.

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Bring Your Own Device (BYOD)

Institutional Review Board (IRB)

One-to-One Technology (1:1)

Teacher Attitudes Toward Technology Integration Scale (TATTIS)

Technology Acceptance Model (TAM)

Theory of Reasoned Action (TRA)

CHAPTER ONE: INTRODUCTION

Overview

This study will explore the impact of one-to-one device technology initiatives in public school classrooms and the overall effect these initiatives have on classroom teacher attitudes toward technology. As the classroom climate transforms into a more technology-enhanced environment with increased device availability, there is an ever-growing need to understand how attitudes among teachers may be influenced by using these devices in the classroom. By studying the use of Chromebooks and iPads in a one-to-one technology integrated classroom, researchers will begin to understand the ramifications to students', and teachers' attitudes and, whether there are any significant differences in their attitudes based on which device is used. This chapter will discuss pertinent information related to the study's background, problem statement, and purpose statement. Also included is the significance of the study and a defined list of terms.

Background

Students that are currently enrolled in elementary, middle, and high schools have never lived in a world where digital technology did not exist (Lamanauskas, 2011). In current educational practices, the use of technology in instruction is growing at a rapid pace. Technology is being widely used in teaching and learning practices in areas like traditional classrooms, blended instruction, flipped classroom settings, and online environments (Saunders, 2014). With the availability of technology tools and instructional content, educators are being encouraged to integrate the use of these tools into classroom activities (Brown-Martin, 2012). With the implementation of Bring Your Own Device (BYOD) and One to One Device (1:1) initiatives, students have a variety of technology and software available to them. This has

allowed changes such as implementing computer and digital technology into daily lessons to help learners retain information and make topics interesting (Sankey, Birch, & Gardiner, 2011). Chromebooks and iPads are examples of one-to-one technologies. Chromebooks, as laptops, are affordable and useful mobile devices, and are very suitable for classroom settings (Sahin et al., 2017). Apple iPads, as tablets, are touch-based mobile devices, considered simple to use, and are the dominant tablet device used in education (Young, 2016). Along with the current technology initiatives and device integration strategies, it is imperative to consider the classroom teachers, their perspective of technology use, and their attitude toward technology.

The role of technology has changed as new technologies have been used more often in education in the last decade (Li, 2007). With the rapid development of technology as well as advances in electronic learning technologies, mobile learning has begun to occupy a great part of our lives (Baek, Zhang, & Yun, 2017). Instructional design researchers began to work with computer software specialists to develop interactive instructional systems, causing the role of the instructor to change to reflect more flexibility in the learning environment (Tennyson, 2010). In 1996, a report by the National Commission on Teaching and America's Future indicated that teachers need to "continually learn new technologies" to keep up with the "sweeping economic changes" in today's world (p. 7). This report indicated that technology could be used to implement changes in the education system and the way teachers taught (Means et al., 1993). When technology is used regularly in the classroom, teachers' practices, as well as students' learning, improve (Kim et al., 2013). A shift in focus has created an impact on content development and the delivery methodology, thus strengthening the way teachers teach (Mai, 2007). Even with these changes, schools' approaches to technology often differ when seeking the best ways of using technology (Baylor & Ritchie, 2002).

In a recent study by Young (2016), teachers' attitudes were broadly positive toward technology integration. Data showed teachers had positive views toward technology's role in enhancing students' learning and making subject matter more engaging, although these positive dispositions toward technology were tempered with residual concerns about their own confidence and competence (Young, 2016). Attitudes and skills of teachers have become key factors in computer use in classroom settings (Beeland, 2002; Christensen, 2002; Woodrow, 1992), and it is important that teachers have a positive mood when using technology in the classroom.

Often, internal barriers such as attitudes, beliefs, and self-efficacy with technology impact teacher technology use and integration (Kim et al., 2013). Therefore, to figure out better ways of technology integration in education, it is important to investigate teachers' attitudes toward technology in different settings (Li, 2007; Teo et al., 2008; O'Bannon & Thomas, 2014), so that teachers can improve their skills with technology and change their attitudes toward the use of instructional technology. It seems that there are more expectations tied to technology use in the profession of teaching and education than in many other careers. The literature shows a significant difference between the attitudes of teachers toward technology and the expectations of the public and professional organizations. These expectations are difficult for teachers to understand because educational technology presents a number of problematic issues for teachers (Glenna & Melmed, 1996). Teachers need support and training to positively integrate technology into their classrooms (Planow et al., 1995).

Many schools have begun to adopt one-to-one computing with the goal of developing students' 21st-century skills, which allow students not only to learn content, but to acquire critical skills such as creativity, collaboration, and digital literacy (Pellegrino & Hilton, 2012).

Mobile one-to-one technology in the classroom offers many benefits to student learning. According to Lipponen (2002), technology can enhance peer interaction and group work, facilitate knowledge sharing, and distribute knowledge and expertise among the learning community. By using technology daily in the classroom, teachers are improving their practice as well as their students' learning and knowledge advancement (Minshew & Anderson, 2015).

Mobility can enhance the integration process due to more flexible use, so that portable devices, such as laptops, can be used in school settings for better instructional outcomes (Sahin et al., 2017). Mobility provides numerous advantages when used for instruction. For instance, a student can easily use the same laptop in a science lab for writing an experiment report and in a classroom to complete classwork (Windschitl and Sahl, 2002), and his same device can be accessed by multiple users in different settings, which also creates a collaborative context in schools (Cervantes et al., 2011). One type of mobility device would be the Chromebook. The Chromebook gives the user the footprint and potential of a laptop without the related cost.

The Chromebook, similar to a traditional laptop computer without all of the legacy hardware, rapidly boots and efficiently operates by connecting and processing most applications through the internet, thus saving costs on local application purchase, installation, and maintenance. Chromebook use may provide students numerous online opportunities for information access. It is important to note that new technologies, such as Chromebooks, require users to practice using new devices with their new features in order to become familiar with them so that they can benefit from those for instructional purposes (Sahin et al., 2017). The main distinction from regular laptops is that Chromebooks are dependent on an internet connection to operate with full functionality. Because students are very familiar with web-based environments

(Conole et al., 2008), this allows users to interact online, share files, collaborate, and communicate effectively.

Integrating technology into the classroom setting is not an easy task. However, when it is properly accomplished, teachers' and students' teaching and learning qualities are positively influenced (Goktas et al., 2009). According to Ifenthaler and Schweinbenz (2013), a majority of teachers are open to integrating tablets and feel they would enhance their practice, but others are not confident about using a new device in their everyday instruction. In addition, the ways teachers integrate devices into their practice is often dictated by school culture (Fleischer, 2012; Greaves et al., 2012). Another type of technology integration device useful in the classroom is the Apple iPad.

The iPad, by Apple, is a touch-based tablet which provides the processing potential of the laptop with the portability of a mobile device that is simple to use and operate. According to Hu (2011), an escalating number of schools around the country are replacing desktops and textbooks with iPads and utilizing Apple's latest device as an overall learning tool. It seems that there was a rush to include this latest technological device in schools. Since the debut of its first generation in 2010, the iPad, has been introduced into K-12 classrooms more widely and speedily than any other previous computing device such as desktops or laptops. It is even predicted that this gadget will soon replace not only traditional computers such as desktops and laptops, but also textbooks in classrooms (Horrigan, 2009; Ochola, Stachowiak, Achrazoglou, & Bills, 2013).

Despite its widespread popularity and use in the classroom, many educators and researchers questioned the rapid iPad integration into classrooms without due consideration of how this new device impacts student learning (Walters & Baum, 2011). While more research about all aspects of Chromebook and iPad use in the classroom is needed, it is important to

understand how teachers use the iPad in their classrooms and their attitudes toward using these devices in their teaching (Vu et al., 2014).

Problem Statement

Though many studies have been conducted related to attitudes, there is little data available about teacher attitudes and implementation of one-to-one device technology in the classroom. A potential gap in literature exists in this area of research, mainly due to the results of a recent study that showed that teachers who use Chromebooks in their classrooms had a significant decrease in attitude after use (Sahin, Top, & Delen, 2017), and another study which showed that teachers did not have highly enthusiastic attitudes when using iPads in their classrooms (Vu, McIntyre, & Cepero, 2014). These research studies describe years of teaching with the devices and have found that attitudes may be directly affected by the amount of time a teacher has experienced both positive and negative technology events during classroom activities. This research study could add to the body of knowledge around attitude research in education, especially related to technology and one-to-one mobile device initiatives in current school systems. The problem is that research has not specifically addressed the difference between the use of mobile devices such as Chromebooks and iPads in middle-school classrooms, and what effects this implementation could have on teacher attitudes toward technology integration.

Purpose Statement

The purpose of this study is to determine if differences exist in teachers' attitudes toward technology integration who use either Chromebook or iPad devices in their one-to-one environment. This study intends to evaluate the differences between the dependent variable, teacher attitudes toward technology integration (self-reported by teachers through survey

responses), and the independent variable, mobile device used (reported as the type of device used in each school district: Chromebook or iPad).

Significance of the Study

The study will examine the expressed attitudes by teachers and how these attitudes may affect the use of mobile devices in their classrooms, and thereby influence student attitudes (Dogan & Akbarov, 2016). There could be many practical outcomes from technology integration research related to attitudes. This research could help with the future design of professional development content, build greater self-efficacy among teachers and students as they encounter technology, and create an atmosphere for positive attitudes toward technology, thus greatly enhancing the achievement, knowledge construction, and educational learning experiences of teachers and students. Additionally, this research could be helpful in creating opportunities to build skills in digital literacy, computer competency, and media interaction.

Research Question

RQ1: Is there a difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale?

Definitions

1.   *Attitude* - Attitude is a psychological tendency that involves evaluating a particular object with some degree of favor or disfavor (Eagly & Chaiken, 1993).

2.   *Bring Your Own Device (BYOD)* - transits ownership of devices to students with the expectation that they use their own devices for learning purposes (Burns-Sardone, 2014).

3. *Digital Immigrants* - Prensky (2001) describes this group as those born prior to 1980, who have not grown up with technology, who struggle to learn and use new technologies, and who, thus, are reluctant to adopt.

4. *Digital Natives* - Prensky (2001) describes this group as those born after 1980 who have grown up surrounded by digital technologies, and who, consequently, are more comfortable using technology than previous generations.

5. *Digital Technology* - refers to the use of digital resources such as web 2.0 tools, digital media tools, programming tools and software applications to effectively find, analyze, create, communicate, and use information in a digital context (New Zealand Commerce & Economics Teachers Association, 2014).

6. *One-to-One (1:1)* - refers to each student having a personal technology device for learning purposes (Carr, 2012; Murray & Olcese, 2011).

7. *Technology Acceptance Model (TAM)* - refers to a model used to explain and predict user acceptance of technology from measures taken after a brief period of interaction with a particular system (Davis, 1986).

8. *Theory of Reasoned Action (TRA)* - refers to a model that looks at behavioral intentions as the primary predictors of behaviors (Marangunic & Granic, 2014)

9. *Ubiquitous Computing* - describes how computers could be embedded within the environment of daily life (Weiser, Gold, & Brown, 1999).

CHAPTER TWO: LITERATURE REVIEW

Overview

More than ever, there is a push to make a connection between the use of technology inside the classroom and the use of technology outside the classroom. As computer technologies have become more affordable and mobile, the very nature of the current generation of citizens' lives, both teachers and students, have changed (Wang et al. 2014). Due to the changes in how teachers and students communicate and collaborate in their personal lives, it has become important to equalize the gap between personal and educational technologies. Students today live in technology-rich environments that shape their interactions with information and with each other (Lee & Spires, 2009). Because of these technological advances, there seems to be an ever-increasing desire, and need, to include these technologies into the education process.

In order to facilitate student learning that is engaging, and meaningful, middle-grade teachers must bridge the gap between their students' uses of technologies in and out of school (Lee & Spires, 2009). The attitudes and responses of teachers will ultimately have an effect on the way students identify with technology and how they learn or distance themselves from technology, especially in the classroom environment.

Theoretical Framework

There are two theoretical models that offer strong connections to this study and provide a basis for the attitudes and behaviors of users and its relationship to technology use and integration in the classroom. The first theory is the Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989). See Figure 1 for Technology Acceptance Model. Historically, the Technology Acceptance Model (TAM) was derived from the Theory of Reasoned Action (TRA) model that looked at behavioral intentions as the primary predictors of behaviors (Marangunic &

Granic, 2014). Davis proposed the TAM by adapting the TRA model to include the attitude of a

person as a subjective norm when predicting behavior related to computer usage. Even though

the TAM has been empirically validated, these studies have shown only a proportional

explanation to the variance in technology usage (McFarland & Hamilton, 2006).
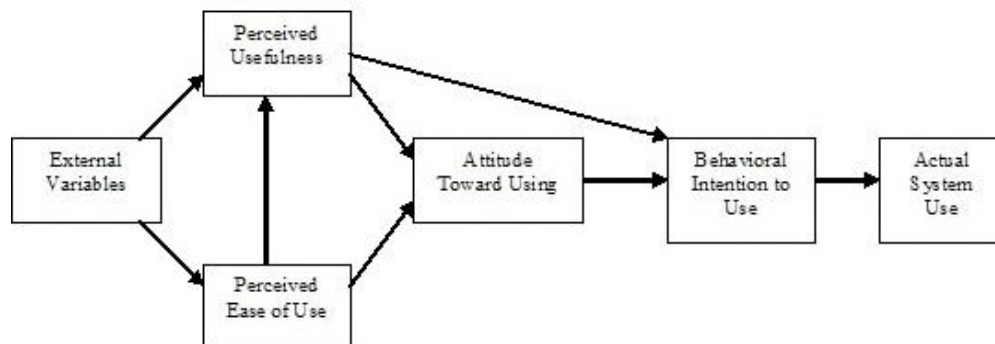
Figure 1. Technology Acceptance Model (Davis, 1989)

The TAM also provides a "basis for tracing the impact of external factors on internal

beliefs, attitudes, and intentions" (Davis, Bagozzi, & Warshaw, 1989, p. 985). In this study,

Davis et al. (1989) suggest a connection between user attitudes as it relates to perceived

usefulness and perceived ease of use, and the effect on technology adoption. Despite this

connection, TAM is limited in that user acceptance behaviors cannot be fully explained by the

perceived ease of use and perceived usefulness (Juhary, 2014).

Therefore, teachers' attitudes toward technology integration, such as beliefs that the

technology will be easy to use and will enhance job performance, would influence teachers'

intentions to use technology in the classroom (Courduff, Szapkiw, & Wendt, 2016). Previous

research suggests that providing users with the support necessary to implement technology can

achieve a reduction to barriers and provide greater benefits from technology acceptance (Gu,

Zhu, & Guo, 2013). Many of these researchers have affirmed perceived usefulness as a construct

in TAM as a means of determining user acceptance of technology and its usefulness (Amin, Rezaei, & Abolghasemi, 2014; Holden & Rada, 2011; Moses et al., 2013; Williams, Slade, & Dwivedi, 2014).

A second theory, Bruce's Transactional View, explains the assumption that technology and literacy are separate, autonomous realms, serving to distance us from a concrete reality of literacy as it changes in a sociotechnical context, and are not just tools or devices used to assist in instruction (Bruce, 1997. p. 302). This means that technologies do not transform literacies, nor are they irrelevant to these practices. The transactional view is not an alternative, but rather, a mutual relation between technology and social practice (p. 303). Thus, technologies do not oppose, replace, enhance, or otherwise stand apart from literacy, but rather, remain connected. As it relates to sociotechnical analysis, there seem to be two ways the transactional view connects to literacy, either all technology is transactional, or all technology is a transaction with other related technologies (Bruce, 1997).

Technology is being integrated into the social practices of teaching and learning as more than a repository of apps that replace traditional materials and methods (Smith & Santori, 2015, p. 175) and is now becoming embedded into the fabric of society and its members, including teachers and students. However, one should not misunderstand the relationship of technology to a social construct and thereby negate its impact on education and instructional design. Modern technologies do not necessarily act as direct replacements for traditional resources and materials but tend to supplement and support them in teaching and learning. Specifically, teachers and students have not transcended the substitution stance described by Bruce (1997) due to a lack of technological understanding but operate within the constraints of societal assumptions and ideologies toward classroom technology use (Bruce, 2014). The New London Group ([nLG],

1996) described these skills and understandings as multi-literacies and suggested that these new literacies reconnect emerging and evolving technological forms for representing texts as well as the plural cultural experiences that are a part of increasingly "globalized societies" (p. 61).

Technology is within us, imbued with our beliefs and values, and we are within it (Bruce 1997, p. 307). Bruce (2014) suggests caution regarding technological assumptions and ideologies within society. Despite the current popularity of one-to-one technology initiatives and the value of student to iPad ratios…the students who may value paper and notebooks or prefer to demonstrate their learning by writing a traditional paper are just as important and relevant (Smith & Santori, 2015).

Related Literature

Among many factors that affect the students' motivation, attitudes and skills, teachers have become key factors in computer use in classroom settings (Beeland 2002; Christensen 2002; Woodrow 1992). Competencies, such as digital literacy, cultural competence, inventiveness, emotional awareness, entrepreneurship, critical thinking, and problem-solving are necessary for success in today's complex and interconnected global landscape and are the basis for 21st-Century learning (Bill and Melinda Gates Foundation, 2013; Metiri, 2013; Partnership for 21st Century Learning, 2018). To make use of technologies in productive ways, whether they are innovative, cutting edge, or more established technologies, middle-grade teachers need attitudes that will facilitate adaptive, creative, and authentic technology use, and need to develop creative and flexible attitudes about technology (Lee & Spires, 2009).

With ever-increasing emphasis on 21st-Century skills-development, the expectations on teachers to take advantage of emerging technologies to support student learning have increased, although it is not clear if teachers are well equipped with the necessary skills, support, and

positive attitudes toward integrating these technologies for instructional purposes (Kale & Goh, 2012). Though, "when teachers are comfortable using technology, they are more likely to integrate technology into the classroom; and their students are the benefactors" (Yu, 2013, p. 8). There is still a moderate belief among teachers that 21st Century learning is synonymous with technology integration (Bernhardt, 2015).

Research-based insight into how technology is utilized in classrooms is often connected to the instructor's perceived familiarity with technology and its use (Skidmore et al., 2014). Institutional norms, resources, and rules influence the way that access to technology, training, support, and professional development influence teachers' use of technology (Orlikowski, 1992). Research suggests that more widespread access to computers in schools makes it possible for students and teachers to move from supplemental and occasional use of computers in the learning process to more integral and frequent use across a variety of settings (Lin & Wu, 2010). In an international study, research found that the sustainability of pedagogical innovations that employed technology was contingent on the teacher (Owston, 2007). Another study focused on teacher attitudes and how they choose, or choose not, to develop and implement technology-led learning into the curriculum, (Lichy, 2012).

Literature suggests that the 21st-Century workplace is infused with digital communication systems such as email, instant messaging, texting, and virtual networking as well as information management systems that expect workers to have sophisticated technological skills and attitudes (Lee & Spires, 2009). Many of these workers do not have training nor have they received professional development in areas of technological need, therefore, are not prepared to meet the challenges of a technology-centered work environment. This is especially true of teachers and administrators.

Today's educators are challenged to provide quality educational experiences with technology (Chien, 2013, p. 6). However, many teachers do not have these experiences to draw upon when facing the challenges of technology use and integration in their classrooms. With attention focused on the paradigm of 21st-Century learning, it is important that schools and districts throughout the United States work to ensure teachers have a clear understanding of 21st-Century learners (Bernhardt, 2015). Classroom teachers should have resources for teaching and learning within close proximity to where learning is taking place (Burns-Sardone, 2014). Technology-related contexts and pedagogies in schools give some shape to learning, but it is the prior knowledge, experiences, and attitudes of teachers that most directly influence how learning will take form in the classroom (Lee & Spires, 2009). Moreover, technology has begun to change education by affecting how students acquire the skills necessary for college and careers, and how educators integrate digital technological instructional strategies into teaching (Delgado et al., 2015, p. 397).

Teachers and 21st-Century Learning

The purpose of 21st-Century learning is to understand teachers' and students' educational experiences in order to help inform appropriate technology use to meet strategic goals for the learning environment (Varier et al., 2017). The concepts surrounding 21st-Century learning have been described and defined in various ways and seem to dominate many of the policies and practices shaping the K-12 educational landscape at all levels of government (Bernhardt, 2015). Increasing efforts to promote 21st-Century learning emphasizes the role of technology in the delivery of instruction for the advancement of skills and abilities required for student success in an increasingly technology-rich society. Learning in the 21st-century includes digital literacy,

reasoning literacy, and other basic skills to be developed and enhanced in primary and secondary education environments. (Spector et al, 2016).

The concept of 21st-century learning is used to describe the various competencies that are needed in order to thrive and excel in today's interconnected and technological landscape. It has become apparent that as public schools move quickly into the future, there is a great need for better equipped teachers within a 21st-century technology classroom (Armstrong, 2014). The apprehension associated with the adoption of advanced technologies in innovative learning environments is partially due to a lack of training among teachers as well as the importance of a consensus in society to provide the resources needed to support 21st-century learning (Spector et al, 2016). When teachers see the value of technology and the impact it can have upon their classroom practices, such awareness opens the gates for further technology integration (Hammonds et al., 2013, p. 40).

Considering that 21st-century learners are active learners, it is necessary for teachers to understand that their role in this technology-integrated 21st-century classroom is as a facilitator, motivator, and tour guide throughout the learning process (Lijano, 2018, p. 93). In order to prepare students, as 21st-century learners, to respond to rapid change and gain necessary skills for innovation and collaboration, it is important to address teaching and learning practices in education (Bernhardt, 2015). Teachers must be at least minimally comfortable with technology use and see the value that these tools can bring to their daily lives before they can consider technology integration as anything more than one more thing required of them (Hammonds et al., 2013, p. 38).

In the 21st-century, nearly all learning environments involve the use of, and depend on, digital technologies, such as computers, hand-held devices, the Internet, and so on (Spector et al,

2016). Moreover, teachers with strong student-centered practices tend to exhibit a more pronounced need to create learning opportunities with technology as a base for enhancing 21st-century skills in students (Ruggiero & Mong, 2015, p. 161). "Given the rapid growth of digital technologies in schools, teachers play a crucial role in the successful implementation of new technologies in classrooms" (Tilton & Hartnett, 2016, p. 79). Although technology use and device integration has increased, teachers continue to use technology as a supplemental teaching tool, not as an instructional tool to engage 21st-century learners (Ertmer & Ottenbreit-Leftwich, 2010). However, simple exposure to technology will not facilitate 21st-century learning skills among students and teachers since they need to interact with technology in order to make it worthwhile (Ruggiero & Mong, 2015, p. 161).

Researchers credit technology as a primary method of empowering students to take control of their own learning (Armstrong, 2014). Moreover, studies suggest that 21st-century learners should take an active role in constructing new knowledge in order for effective and essential learning to take place (Sidney, 2015). "Students actively learn better when technology is integrated into the teaching-learning process" (Lijano, 2018, p. 93). Today's students, immersed in technology are known as digital natives, but their teachers are often playing catch-up because they are digital immigrants (Hammonds et al., 2013, p. 36). The popular assumption that the ''digital natives'' generation surpasses the previous ''digital immigrants'' generation in terms of their technology experiences, presumes that teachers (the digital immigrants) are less savvy with technology than students, the digital natives (Wang et al. 2014, p. 637). For today's "digital natives," paper, pencils, and even textbooks are insufferably old school (Armstrong, 2014). The 21st-century learners classified as digital natives seem to be more interested in classroom discussions when technology-driven teaching occurs (Lijano, 2018).

A study conducted by the Pew Research Center on K-12 teachers' use of technology inside and outside of school (Purcell et al. 2013), indicated that teachers are far more advanced in terms of owning technology gadgets, engaging in internet activities, and having confidence in their technology skills. Though there are generational differences in how teachers experience technologies, the differences emerge between older and younger teachers (Armstrong, 2014). Younger teachers (ages 22–34), demonstrated similar traits as digital natives, and were more likely to use social networking sites and technology to pursue personal interests (Wang et al. 2014). In essence, technology is transforming students into explorers and teachers into guides (Armstrong, 2014).

Instructional Technology in Education

Recent advancements in technology, including the emergence of ubiquitous computing, social networking, and digital representations of vast amounts of information, have altered the way students interact with content and with each other. Technology use in the classroom is rapidly changing how we teach, how children learn, and how school districts spend their resources (Armstrong, 2014, p. 39). The integration of technology into instruction is documented as a critical element in literature reviews and policy discussions, but at the same time, it is an area where innovation has clearly outpaced research and evaluation (Epper & Baker, 2009, p. 4).

Yu (2013) indicated from a recent study that "technology is essential to the functioning of all educators, and it can make a difference in the students' performance levels" (p. 7). However, one should make a distinction between whether the technology is used to support traditional instructional practices or other innovative practices not possible without the use of technology (Liu, Ritzhaupt, Dawson, & Barron, 2017, p. 797). Emerging practices in the instructional

technology field are challenging the assumption that technology should be used as a "supplement" to more traditional approaches instead of fusing it with "reconceptualized" instructional strategies (Epper & Baker, 2009, p. 10).

It is no longer a question of whether teachers should use technology in the classroom, but when and how should it be used. The expectation to use has greatly increased each year from local, state, and federal administration. Effective technological change is not possible simply by adding technology to existing instructional practices, but by aligning technology to learning objectives and creating a direct correlation between the two (Epper & Baker, 2009). How a teacher uses this technology becomes an important factor because just having technology in the classroom does not prove beneficial unless it has been properly integrated into curriculum and the instructional environment. Because technology will continue to evolve, gathering information about the use and integration of educational technology in classrooms is of international importance (Skidmore et al., 2014). If a teacher has a rich and well-integrated understanding of how students learn the subject matter and technology, said teacher is able to draw upon this knowledge to implement technology into everyday teaching practice (Courduff, Szapkiw, & Wendt, 2016, p. 27).

The digital native generation is defined by its use of technology, something that educators must take into account when planning what and how to teach (Walling, 2012). No longer can instruction be isolated to just printed texts and paper submissions. The new classroom will need to expand the instructional design process to include new process and new technologies. The impact on learning using these new technologies may not be realized unless new methods, tools and resources are used effectively to encourage students to gain knowledge (Spector et al, 2016). Youth in today's society have been surrounded by digital technologies since birth, and that has

influenced how they live, work, play, and learn (Grant & Barbour, 2013). It is important to understand the term 'digital technologies' as referring to multi-functional equipment or devices, often with communication links and internet connectivity (Aldhafeeri, Palaiologou, & Folorunsho, 2016, p. 342).

In a report from Educause, "students have never known a world without personal access to information technologies, often take them for granted, and integrate them seamlessly into their daily lives" (Caruso & Salaway, 2007, p. 1). With a variety of devices available to consumers, there is a renewed presence of technology available for use in the classroom and in the home. According to O'Hara (2011), digital technologies include devices such as desktop computers, laptops, and mobile technologies. From the perspective of parents, teachers, and administrators, it would seem that technology is changing the way many students learn (Armstrong, 2014). New technologies can support 21st-century skills and provide for personalized learning as well as a system that is responsive to the needs of learners and teachers (Spector et al, 2016).

The large investment in educational technology at the federal and state levels has stimulated considerable research related to the impact of technology in education (Liu, Ritzhaupt, Dawson, & Barron, 2017, p. 796). Fortunately, this investment in research has also created the need for these studies in order to support the costs and needs of integration. The number of educational research studies that focused on implementation of technology in education was driven by the substantial increase in global internet use (51% by 2000, and more than 97% by 2007) in the early 2000s (Hilbert and Lopez, 2011).

Effective implementation of instructional technology in an educational environment involves fundamental restructuring (Shattuck et at., 2011). Although teachers may be introduced to technology outside of the classroom that helps to develop skill and confidence, normal use of

technology might not transcend completely into use of technology for instructional purposes (Skidmore et al., 2014).

Ubiquitous computing in education focuses on "learning environments in which all students have access to a variety of digital devices and services, whenever and wherever they need them" (Van't Hooft et al., 2007, p. 6), describes how computers fit within daily life and addresses availability of technologies (Weiser, Gold, & Brown, 1999). These learning environments help support the educational experience among students, allowing them to access the devices they need at any time. Integrating resources, technologies, and activities can contribute to efficiency and keeping learners engaged (Spector et al, 2016, p. 60). This level of engagement is important for the student as they strive to be productive in their educational experience. The constant introduction of innovative educational technologies requires that schools develop an organizational learning culture, a culture which helps to cope effectively with the never-ending changes in educational technologies (Collinson, 2010; Zhao & Ordóñez de Pablos, 2009; Weldy & Gillis, 2010).

Technology education and integration in the classroom has become the responsibility of the teacher, rather than that of a designated computer teacher or special teacher (Burns-Sardone, 2014). Not only has this been a necessary move for technology education in the classroom, but also an opportunity for technology use and learning outside the classroom as well as at home. New technologies have been used more often in education in the last decade (Li, 2007) than in many prior decades. Teachers' self-efficacy for using mobile devices is becoming increasingly important as the use of mobile technologies in schools increases (Tilton & Hartnett, 2016, p. 88). Whenever people view this technology as favorable, they are more likely to accept, acquire, and utilize it for purposeful uses (Ajzen & Fishbein, 1980; Wallace & Sheetz, 2014). In a recent

study by Aldhafeeri, Palaiologou, and Folorunsho (2016) of teacher attitudes toward digital devices in their personal lives, the authors infer that the majority of teachers report a positive experience and that these technologies tend to help facilitate their daily lives.

Attitudes and confidence appear to be shifting among teachers in the classroom. A possible reason for the attitude shift lies with a younger generation of active teachers in public education. These younger teachers are described as digital natives who are more comfortable with technology use than their "digital immigrant" counterparts who have not grown up with technology and may struggle to learn and use new technologies or are resistant to adopt or change (Thomas & O'Bannon, 2014). A generation of students has grown up in a technological era, comfortable with its use as a result of the resources available in their homes (Gumbo, Makgato, & Helene, 2012; Lawless & Pellegrino, 2007; Miller, 2012). Within this generation where digital natives became teachers, technology integration would no longer be a problem (Prensky, 2001). Although technology use and integration has increased, teachers continue to use technology as a supplemental teaching tool, not as an instructional tool, to engage 21st-century learners (Ertmer & Ottenbreit-Leftwich, 2010).

Children in school today were born into social and educative environments where digital technologies were and continue to be a part of everyday life (Lee & Spires, 2009). Although many students and education professionals have been comfortable using technology outside of an educational domain, there appears to be a separation between the theory of use and the practice or practical use of technology, especially if technology has been used to fulfill instructional objectives (Gumbo, et al., 2012; Lawless & Pellegrino, 2007; Miller, 2012). Digital natives, often characterized by their desire to multitask, gravitate to visual media, prefer to work on activities rather than reading texts or following instruction, and tend to be less motivated in

environments that lack technology (Thompson 2013). The emergence of this technologically savvy digital native generation is cause for an evaluation of educational systems including teacher education and professional development (Lee & Spires, 2009).

Therefore, teachers must learn to integrate technology if they are to keep up with students who see technology as a normal part of their everyday life (Chien, 2013). It is vital that schools and educators respond to changes in students' experiences with educational technologies in order to leverage students' developing capabilities with technologies in ways that will prepare them for a future in the global information society (Tapscott 2009; Thompson 2013). In fact, teachers and researchers are becoming increasingly interested in learning how technologies might improve K-12 education (Azzam, 2006; Bolick, Berson, Coutts, & Heinecke, 2003). Therefore, middle-grade educators, in particular, must help their students navigate new computing, social, and information technologies and utilize specialized approaches and pedagogical knowledge for using technology in their classrooms (Lee & Spires, 2009).

Research now suggests that the assumed gap that teachers' lack of knowledge related to technology integration in schools should be narrowed because more digital natives are involved in teaching careers and teachers from the previous generations seem to be catching up with technology use (Wang et al. 2014).

Technology Integration in the Classroom

Since late in the 20th century, there has been a constant influence and push to include and integrate technology into an educational environment and, more specifically, the classroom. Technology integration has become evident in nearly all aspects of daily life and culture, and therefore needs to be integrated into the teaching and learning process within our classrooms (Yu, 2013). This technology integration initiative, including computers, mobile devices, tablets,

and smart phones, has changed the environment of education for both the student and the teacher. It is clear that mobile handheld devices are perceived by students, teachers and researchers as intrinsically engaging (Backer, 2010; Jones & Issroff, 2007; Pachler et al., 2010), and seem to be in agreement about how laptops and tablets have been shown to improve class participation (Armstrong, 2014). "Two out of three students (67%) who use laptops in class say that it helps them learn math and science better, and more than half of students who use tablets in class (55%) say it helps them learn math and science better" (p. 39).

The rapid proliferation of mobile devices has resulted in conditions where parents have a mobile phone, and a situation where nearly all school students have their own (Nedungadi & Raman, 2012). This proliferation trend is increasingly spreading in schools' learning, transforming the way students learn and how they consume educational information (Lee & Son, 2013). Integrating technology into classroom settings is not an easy task. These mobile tools do not magically solve all of the problems that classroom teachers face, but often come with challenges that educators must meet head-on and require learning to wield them effectively with students (Armstrong, 2014).

In order to ensure quality teaching and learning, teachers must recognize and meet the challenges of managing the obstacles, barriers, and challenges of integrating technology into classroom instruction (Yu, 2013, p. 10). Teachers play a significant role in the technology integration process (Ottenbreit-Leftwich et al. 2010). When teachers see the value of technology and the impact it can have upon their classroom practices, such awareness opens the gates for further technology integration (Hammonds et al., 2013, p. 40). In order to observe teacher confidence and comfort using technology, and ultimately, classroom technology integration, one should consider the level of technology experience and perceived support of technology by

teachers (Liu, Ritzhaupt, Dawson, & Barron, 2017). Ruggiero and Mong (2015) cite recent improvements in technology integration support within the classroom and provide opportunities to examine the relationship between what technology teachers use and how they use it within their classrooms (p. 163). In fact, many teachers and administrators do not always understand the potential of a successful mobile learning initiative or how to properly implement the plan (Lacey, Gunter, & Reeves, 2014).

Rehmat and Bailey (2014) suggest that teachers usually refer to preexisting beliefs and experiences as they integrate technology and these beliefs actually influence their instructional practices and idea development. There is a distinction among teachers with technology integration that involves using technology in the classroom to support instruction which is different from other uses of technology in their profession (Liu, Ritzhaupt, Dawson, & Barron, 2017). Ritzhaupt et al. (2012) suggest that "classroom technology integration is not a fixed target that can be reached uniformly and considered accomplished" (p. 247).

Studies over the last ten years by researchers such as Arrowood (2010), Ertmer (2012), and Vannatta (2009) have suggested that if technology integration is to be accepted in the classroom, teachers need to be a primary stakeholder in the adoption process, as well as to help foster the active learning process and allow technology to become an indispensable education tool. Existing research suggests that the perceived value of technology can affect teacher use and integration in positive and negative ways (Donnelly et al., 2011; Oblinger, 2014; Shinas et al., 2013; So et al., 2012). Several studies on technology integration have confirmed the factors related to teachers' use of technology and the potential classroom impact, seem to be focused on personal, professional, and organizational constraints (Buabeng-Andoh 2012; Drent and Meelissen 2008; Miranda and Russell 2012). Because of current technology trends, researchers

have demonstrated that technology integration is essential to meet education goals (e.g., Keengwe, Schnellert, & Mills, 2012). There are also studies that identify the importance of school level access and support in predicting technology integration and suggest school support as the most important predictor of technology integration (Hsu and Kuan 2013; Karaca et al. 2013; Perrotta 2013). In a study by Liu, Ritzhaupt, Dawson, and Barron, classroom technology integration was positively influenced at the teacher level, by experience teaching with technology, technology support, access to technology, teacher confidence using technology, and teacher use of technology (p. 806).

During the process to develop technology habits and skills among students, teachers have a vital role to teach them effective strategies for using the tools available to them safely and ethically, which is only possible with appropriate technology integration in the classroom (Pittman & Gaines, 2015). Thus, true technology integration will require an "attitude change" on the part of many teachers, and just doing things the "old way" will no longer work (Yu, 2013, p. 8).

Therefore, when technology integration is accomplished properly, teachers and students are influenced very positively in terms of teaching and learning quality (Goktas et al. 2009). This has included the implementation of virtual education, online learning, and, more recently, the potential of teaching and learning with mobile computing devices. Despite the increasing use of technology initiatives in school systems, studies have found that middle-school students may use laptops, smartphones, and tablets for homework, but few are using these mobile devices in the classroom, particularly tablets and smartphones (Armstrong, 2014).

One-to-One (1:1) Device Technology Initiatives

A one-to-one environment refers to each student having a personal device for learning purposes (Carr, 2012; Murray & Olcese, 2011). With the development of modern technologies, there has been an abundance of initiatives in the direction of helping education environments gain access to these technologies for the purpose of teaching and learning. In a recent survey, over 50% of teachers say they now have a one-to-one student-to-device ratio (Gorman, 2016) which has increased over previous years. In many classrooms where technology resources are limited, there is an apparent effect on learning.

Seymour Papert likened a classroom with limited computer access to students sharing several pencils and expecting the impact of limited resources not to affect learning (Storz & Hoffman, 2013, p. 2). Therefore, with the ongoing pressures to implement an environment where each student can have access to a device and can use that device for learning and skill development, the outcomes could be significant. Research focused primarily on technology integration has been concerned with teachers' perceptions of technology adopted by school systems or larger initiatives (Courduff, Szapkiw, & Wendt, 2016). With the implementation of Bring Your Own Device (BYOD) and One-to-One Device (1:1) initiatives, students have a variety of technology and software available to them.

Mobile devices are becoming increasingly ubiquitous in society, particularly with youth (Grant & Barbour, 2013). Mobile learning devices are relatively affordable and accessible, and often reinforce difficult learning concepts and a mechanism for collaboration outside regular school hours (Cristol & Gimbert, 2014). These relatively affordable, portable and networkable devices have meant many schools now see them as a viable option for equipping their students with a learning resource compatible with the demands of 21st-century learning (Falloon, 2015).

Mobility provides numerous advantages (Sahin, 2016) such as flexibility to work on school work and projects in learning environments without being dependent on a location (Demb et al., 2004). The potential of mobile learning for real-time experiential learning is endless (Melhuish & Falloon, 2012). Hutchinson, Beshorner and Schmidt-Crawford (2012) found that the use of mobile tablets showed an increase in student expressive responses, imagination, and engagement while studying text. The 2013 Horizon Report (Johnson, Krueger, Conery, & Becker, 2013) described mobile learning with apps as "extremely conducive to productivity and learning" (p. 16). Teacher training and support enables the integration of technology to become a seamless component of the curriculum (Trombley, 2006).

Tablet computers, as mobile devices, can be used anywhere/anytime and foster individualized learning, such that teachers can use the devices as tools for scaffolding student learning (Lemke, Coughlin, & Reifsneider, 2009; Melhuish & Falloon, 2010). Tablets have made classroom-infused technology more accessible on a wider scale to all students in a classroom due to their relatively low cost, portability, and ease of use and navigation (Mang & Wardley, 2012). Tablets, smartphones, and mobile apps have become too capable, too ubiquitous, and too useful to ignore (Johnson et al. 2013, p. 16). An increasing number of schools are mandating inclusion of mobile devices through Bring Your Own Device (BYOD) or mobile learning programs and initiatives. BYOD transits ownership of the devices to students with the expectation that they use their own devices for learning purposes (Burns-Sardone, 2014, p. 192).

Worldwide spending for classroom tablets has increased by 60%, and projections indicated that U.S. schools would purchase another 3.5 million tablets by the end of the year (Chandler & Tsukayama, 2014). There is a gap between mobile technology use in the home and

in the school. Where 39% of middle-school students use smartphones for homework, only 6% report that they can use the smartphone in classroom for school work. Although 31% say they use a tablet for homework, only 18% report using it in the classroom (Armstrong, 2014).

Educational researchers and practitioners have been advocating for one-to-one mobile computing, which would equip students with personal mobile devices and enable 24/7 access so that the devices can mediate learning both in and out of the classroom (Looi et al., 2011). One-to-one programs have had a significant impact on curriculum, instruction, and learning in middle schools (Silvernail, Pinkham, Wintle, Walker, & Bartlett, 2011), and notably, teachers in one-to-one programs showed a higher level of awareness to the time invested in preparing digital learning materials (Blau & Peled, 2012). Within the various one-to-one classrooms, previous research suggests that computer usage in one-to-one environments is strongly correlated with how closely that usage can be aligned with teacher attitudes and beliefs (Larkin & Finger, 2011; Penuel, 2006).

Therefore, when it comes to implementing a large-scale one-to-one computing initiative, deciding which device students will use every day to support their learning requires a significant amount of thought and research (Demski, 2012, p. 28). However, school systems that adopted a one-to-one policy, found that the policy increased student and teacher technology use and increased student engagement and interest (Bebell & O'Dwyer, 2010). Findings from a study by Tilton and Hartnett show that fostering collective efficacy in a class can enable teachers and students to become collaborators when using mobile technologies for learning (Tilton & Hartnett, 2016, p. 87).

Recent developments in mobile technology have spawned a new array of digital, touch-screen learning tools, such as tablets like the iPad. Tablet computers began to make inroads into

education following Apple's introduction of the iPad in January 2010 (Young, 2016, p. 184).

Tablets, such as the iPad, are the first series of devices that provide the processing potential (and

screen size) of a netbook, but the portability of a mobile device (Grant & Barbour, 2013, p. 4).

Since its release in 2010, Apple's iPad has attracted much attention as an affordable and flexible

learning tool for all levels of education (Falloon, 2015). The iPad has "penetrated K-12 faster

than any other computing technology" (Norris & Soloway, 2012, p. 42). According to the Bates

and Poole (2003) model, indications are that iPads are an appropriate choice for use in schools,

depending on the instructional and educational goals of administrators and teachers. Apple

iPads, as tablets, are touch-based mobile devices, considered simple to use, and are the dominant

tablet device in education (Young, 2016).

Not only does the iPad provide the potential for universal learning, but it characterizes

various applications to tailor an individualized education for each student (Beschorner,

Hutchinson, & Schmidt-Crawford, 2012; Fallon & Melhuish, 2010). As opposed to desktop and

laptop computers, teachers tend to use iPads for learning activities that focus on creativity,

production and collaboration (Kalonde, 2017, p. 31). The use of iPads has the potential to

revolutionize learning, not because they will drastically improve test results, but rather engage

21st-century learners via a digital and interactive medium requiring critical thinking, creativity

and collaboration, as well as personalization of learning (McFarlane 2013).

Melhuish and Falloon (2012) argue that due to mobility, iPads have the potential to

facilitate constructivist learning principles and enhance collaboration, student autonomy,

metacognition, authenticity and problem-solving, and encourage teachers to become facilitators.

Devices such as iPads can not only expedite learning in a modern classroom, but also help

eliminate many of the traditional barriers for students related to time and space issues (Rhor,

2013). Teachers who had previously thought technology was too time consuming, or an add-on, found the iPad enhanced instruction due to easy navigation, collaborative problem-solving, differentiation by application, quick start-up and shut-down, and language options (Hutchinson et al., 2012).

As iPad-based technologies grow in acceptance and accessibility as a tool for educational use, educators have increasing opportunities to learn from the experiences of other educators, administrators, and consultants who have experienced the process of implementing and utilizing iPads for class-wide purposes (Maich & Hall 2016). It is no longer an issue in education as to whether iPads should be used for classroom instruction, but how and how often (Kalonde, 2017). As iPads increasingly make their way into classrooms, teachers are expected to integrate them into their practice, often without direction or guidance about how that integration might best be approached (Smith & Santori, 2015). In a recent study, Young (2016) notes that the use of iPads by teachers has demonstrated largely positive results (p. 188). Unfortunately, studies that might provide empirical evidence on the impact of iPad integration in K-12 classrooms are in the early stages (Jahnke and Kumar, 2014). Walsh and Simpson (2013) agree that research into the impact of iPads on teaching and learning is still new, showing both positive and negative benefits for the learning experience.

Experience in maintaining and using an iPad for personal or professional needs is likely to be quite different than the potentially frustrating experience of maintaining a classroom set (Maich & Hall 2016). Even in a professional environment, many teachers tend to use iPads primarily as a personal learning tool, which creates an expectation that professional development sessions will largely focus on the potential of the devices and not necessarily how the teachers are actually planning to use it (Grant & Barbour, 2013).

When students are part of a one-to-one iPad project or use a class-set, they expect to use the iPad each day in their learning. This results in teachers having to rethink their classroom approach and alter their pedagogy appropriately (Foote, 2012), thus causing teachers to adjust their perceptions about the challenges and potentials of iPad integration (Grant & Barbour, 2013; Lemai et al., 2015; Pegrum, Oakley, & Faulkner, 2013; Santori, Smith, & Schugar, 2014); and the ways the iPad supports collaborative learning and creativity (Falloon, 2015; Hutchison, Beschorner, & Schmidt-Crawford, 2012). Magley (2011) and Foote (2012) have witnessed successful one-to-one iPad implementation through their research.

The impact to American education through the use of Chromebook devices cannot be overstated (Ahlfeld, 2017). Chromebooks, as laptops, can be given as an example of laptops that are produced for particular use because they are affordable and useful mobile devices, which are very suitable for classroom settings (Sahin 2016). An important advantage of Chromebooks over traditional computers is that because Chromebooks lack many of the legacy components found in PCs, they boot rapidly and immediately connect to the internet. This results in faster productivity and access (O'Donnell & Perry, 2013).

Chromebook use may provide students numerous online opportunities for information access since they are cloud-based and require an Internet connection in order to be fully functional (Sahin 2016). However, they may also cause other issues for school systems. Some of these issues are the fact that they do not run the Windows operating system and therefore will not run Windows-based productivity apps and programs that may be beneficial or even necessary to the classroom (O'Donnell & Perry, 2013). Many schools implement Chromebooks in their teaching and learning strategies because of their availability versus cost, their ease of use by students, and their useful connection to cloud-based apps, storage, and communications. In a

recent survey, the results show an increase in Chromebook sales and that 60% of educators stated that they have access to the device. The survey also indicated that Chromebooks are mainly used in older grades, such as upper elementary and middle-grades by as much as 66% (Gorman, 2016).

The practical, durable form factor of a Chromebook is another reason to use this device (Schaffhauser, 2015), since it has many of the features of the laptop as well as features of a tablet computer. This also enables Chromebook users' various opportunities to meet online, share files, and communicate mutually with its unique features. Technologies, such as Chromebooks, require users to practice using new devices with their new features in order to become familiar with them so they can benefit from those for instructional purposes (Sahin 2016).

Teacher Attitudes Toward Technology Integration

Attitude is a precarious behavior to understand when connected to areas of study like curriculum design, classroom technology integration, and personal technology usage. One is usually predisposed to a uniquely personal viewpoint when approaching choices based on desires and intentions, because of both internal and external factors that help to influence the choice.

"Attitude is typically viewed as a latent or underlying variable that is assumed to guide or influence behavior" (Fishbein & Ajzen, 1975, p. 8). Ajzen (1988) defines attitude as a complex conundrum of feelings, desires, and fears that create a state of readiness to act within a person. Attitude refers to the mannerisms of a person in reference to a specific behavior and how that behavior affects performance (Fishbein & Ajzen, 1980).

According to Park (2009), one's actual use of a technology system is influenced directly or indirectly by the user's behavioral intentions, attitudes, perceived usefulness of the system, and perceived ease of the system. In the context of one-to-one classrooms, previous research

suggests that computer usage in one-to-one environments is strongly correlated with how closely that usage can be aligned with teacher attitudes and beliefs (Larkin & Finger, 2011; Penuel, 2006).

The positive attitude of teachers toward the adoption and integration of technology is significant to its successful integration (Botha & Herselman, 2015). Since this positive attitude often develops along with the user's knowledge, understanding, and competency with technology systems; therefore, in order for teachers to develop self-efficacy in technology integration, they require a positive attitude and strong motivation (Rehmat & Bailey, 2014). A positive attitude should subsequently lead to the integration of technology by the instructors in their teaching (Motshegwe & Batane, 2015, p. 4).

Even though teachers often have positive beliefs and attitudes about using technology to support student-centered learning, their actual instructional practices do not always reflect those beliefs (Gunter & Reeves, 2017). Even when many teachers have positive attitudes, training, and preparation necessary to implement technology into instruction, the time to complete these tasks often seem to pose a barrier to successful integration (Gorder, 2009; Kirkscey, 2012; Wright & Wilson, 2011). A lack of skill and knowledge may translate directly to lower sense of self-efficacy and an absence of many of the positive attitudes that are necessary to motivate teachers to use technology (Holden & Rada, 2011).

Research has consistently shown that teachers' underlying beliefs and attitudes are key elements that influence use and integration of digital technologies in the classroom (Tilton & Hartnett, 2016). Past studies agree that teachers' attitudes toward technology has often been a strong predictor of technology integration in classroom instruction (Capo and Orellana 2011; Howley et al. 2011; Miranda and Russell 2012). In a study by Pittman and Gaines (2015),

among three factors that relate to integration, the strongest correlation with technology integration was attitude toward technology. Teachers' attitudes and teacher's instructional strategies can have a significant impact on student learning outcomes (Gunter & Reeves, 2017).

Changes in attitude can often be attributed to inconsistencies like changes to curriculum standards, changes in teaching practices, and a general lack of knowledge about utilization of technologies that surround them in the real world (Kenny & McDaniel, 2011; McDaniel & Kenny, 2013). The beliefs that will ultimately impact teachers' intention to use technology and the levels of technology used in the classroom center around teachers' attitudes toward technology, beliefs that the technology will be easy to use, and beliefs that the technology will enhance job performance (Courduff, Szapkiw, & Wendt, 2016).

Recent research (Abbitt, 2011; Chen & Jang, 2014; Stewart, Antonenko, Robinson, & Mwavita, 2013; Yang & Huang, 2008), also shows that changes in teacher attitudes are a result of learning new teaching skills or techniques (Overbaugh, Lu, & Diacopoulos, 2015). In a study by Gunter and Reeves (2017), the authors contend that these changes in attitude among teachers align with the idea that teachers who feel comfortable with, and empowered by technology, will likely integrate these technologies into classroom curriculum.

One must not forget to include the use of technology in teachers' personal lives as a factor connected to success, where there would seem to exist a dichotomy of sorts between personal lives, attitude, and aptitude toward digital technologies and their classroom practice (Aldhafeeri, Palaiologou, & Folorunsho, 2016, p. 353). A study by Pittman and Gaines (2015) suggests that "teachers' attitudes and beliefs about the importance of technology integration and direct student access to computers within the classroom had significant positive correlations with high-level technology usage" (p. 539).

Despite increased access to technology (Gray et al., 2010), studies continually report the under-use of technology in schools across all grade levels (National Education Association, 2008). This may suggest even schools with access to devices face challenges in actually integrating them into the curriculum. During informal learning situations, mobile devices have been shown to create advantages in the way individuals learn; whereas, during formal learning environments these advantages are neutralized unless the teacher properly integrates the mobile devices with specific content (Gunter & Gunter, 2015).

Some teachers perceived themselves as technology savvy, but acknowledged the need to learn technology integration strategies, and were not sure how to strategically plan and have students use technology tools in the classroom (Wang et al. 2014). In addition, teachers encounter personal barriers such as attitudes and beliefs, perceived value of technology, and comfort with technology, which may influence the actual use of technology in the classroom (Ertmer et al., 2012). Teacher attitudes and pedagogical beliefs toward emerging technology represent one of the most critical issues facing educators (Chien, 2013). MacArthur and Malouf (1991) noted that teachers' technology use in their teaching is related to their attitudes toward technology. Teacher attitudes and beliefs toward technology, as well as lack of time and adequate resources, may deter teachers from integrating technology in their lessons (Andrei, 2017, p. 409), despite teachers' positive attitudes toward technology integration (An & Reigeluth, 2012).

Professional development is extremely necessary for educators, especially if they are going to maintain current teaching strategies, model best practices, and stay relevant with the latest instructional technologies (Epper & Baker, 2009). In a study by the Bill & Melinda Gates Foundation (2012), 48% reported lack of training as the primary barrier to implementing

technology into their teaching (p. 3). Teachers' attitudes and motivation to use and integrate technology in the classroom (Ertmer et al., 2000) and their comfort with using technology (Rakes, Fields, & Cox, 2006) are important elements. Teachers often report not getting adequate training on specific technologies or appropriate technology integration strategies from professional development, and therefore, tend to not use technology as a support for teaching (Bill & Melinda Gates Foundation, 2012).

Teacher anxiety toward, and attitudes concerning instructional technology, can strongly influence the success of the adoption of instructional technology for classroom use (Shattuck et al., 2011, p. 292), and play a pivotal role in the success or failure of technology-implementation projects and innovative technology in the classroom (Avidov-Ungar & Eshet-Alkakay, 2011). Some researchers claim that the role of teacher attitudes should be more empirically tested (e.g., McCormick & Scrimshaw, 2001), because deeper understanding of teacher attitudes toward Information and Communication Technology (ICT) can help avoid obstacles in technology implementation in schools (Hew & Brush, 2007).

Understanding teachers' attitudes toward emerging technologies in relation to teaching is a key step in identifying factors that facilitate or impede adoption of these technologies in their practices (Kale & Goh, 2012, p. 45). Research shows that the success of technology use in educational settings largely depends on teacher attitudes toward technology use (Albirini, 2006, Baylor & Ritchie, 2002). Teachers who are more open to professional change also have a more positive attitude toward ICT (Blau & Peled, 2012). Teachers' attitudes are considered a major predictor of the use of new technologies in educational settings (Albirini, 2006). Also, teachers perceived value of technology to teaching/learning seemed to elicit positive attitudes and beliefs toward ICT with integration into in-class teaching (Jimoyiannis and Komis, 2007; Anderson and

Maninger, 2007; Kim, Kim, Lee, Spector, and DeMeester, 2013). While some teachers express high enthusiasm toward teaching in one-to-one classrooms, others are concerned about non-educational usage of technology during the lessons (Silvernail et al., 2011).

Young's research suggests a largely positive disposition toward technology with the usage of iPads by teachers, though tempered with residual concerns about their confidence, competence and changes in classroom practice as iPad projects commenced (Young, 2016). Ertmer et al. (2012) stated that teachers' negative beliefs and attitudes about the relevance of technology to students' learning, and their own limited knowledge are the strongest barriers for technology adoption. In some cases, the literature suggests that teachers' attitudes significantly decreased after teaching with Chromebooks for a year (Sahin, Top, & Delen, 2017).

Teachers who volunteered to teach in the one-to-one classes use online communication for personal and professional purposes more than teachers that did not volunteer to teach in the program (Blau & Peled, 2012). True technology integration will require an "attitude change" on the part of many teachers, as dedicated teachers emerge themselves in technology and are driven to use new technology to enhance teaching and learning (Chien, 2013, p. 8).

Summary

The common goal in education is to find the most robust and capable method of communicating instructional content to students. Often the most time-honored traditions in education are too easily left behind in order to allow room for new trends and new ideas. The technology expansion in society and in education is one of those new trends and ideas. With modernization and technological advancement, the push to find new methods for use in the teaching and learning process is at the top of most educational institutions' list of priorities.

These priorities may provide great opportunities for technological advancement and often cause concern among teachers and students due to the rapid changes and the need for training and professional development. With the current trends in classroom technology integration and device usage, the expectation for teachers who are highly qualified in the use of these technologies has increased.

According to the literature (Sahin, Top, & Delen, 2017; Vu, McIntyre, & Cepero, 2014; Kim et al., 2013; Beeland, 2002; Christensen, 2002; Woodrow, 1992), there are many areas of study available in attitude research. This study, related to attitudes toward technology, could add to the existing body of literature and research knowledge, as well as help promote further development of new technology-enhanced curriculum design techniques that would include the integration of technologies such as multimedia, interactivity, e-learning, and 21st-century skills.

There are often influences and factors directly linked to attitudes among teachers. Contained within these influences and factors are multiple connections to areas like belief, understanding, competence, self-efficacy, behavior, and action. With constant influence among these factors, it is difficult to ascertain the true attitude of the teacher, especially as it relates to the use of technology. These attitudes, when positive, can help to accentuate the instructional process and, when negative, can often hinder the instruction.

This study, related to attitudes toward technology among teachers who use mobile devices such as Chromebooks and iPads in their classrooms, could help promote further development of new technology-enhanced curriculum design techniques, increased opportunities for technology education, and enhanced 21st-century skills among teachers and students.

Chapter Three: Methods

Overview

The focus of this study was to examine mobile device technology in a one-to-one classroom and the attitudes of middle-school teachers toward technology who teach with these devices. Therefore, the purpose of this study was to determine if differences exist between teachers' use of either Chromebook or iPad devices in a one-to-one mobile device integrated environment and their positive or negative attitudes toward technology. This chapter will discuss the study's design, research question, hypothesis, instrumentation, procedures, and data analysis. The study's participants and settings will also be discussed.

Design

A quantitative, causal-comparative research design was used to determine if mobile device usage in classrooms (Chromebook or iPad) would influence middle-school teacher attitudes toward technology integration. This design is chosen when random assignment is not possible and pre-established, non-random groups occur naturally in school settings (Gall, Gall, & Borg, 2007; Warner, 2013). The dependent variable in this study was teacher attitudes toward technology integration. Teacher attitudes toward technology integration is the converging influence between belief, behavioral intention, and performance related to computer and mobile device usage in an education setting (Fishbein & Ajzen, 1975; Fishbein & Ajzen, 1980; Larkin & Finger, 2011; Penuel, 2006). The independent variable was the type of mobile device used in the one-to-one middle-school classroom, either Chromebook or iPad. A Chromebook is a useful computing device like a laptop that is an affordable mobile device option for the classroom setting (Sahin et al., 2017). An Apple iPad is a simple to use, touch-based tablet that is considered a powerful mobile device for educational environments (Young, 2016).

Research Question

RQ1: Is there a difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale?

Hypothesis

H_01: There is no statistically significant difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale.

Participants and Settings

The population for this study was drawn from a convenience sample of 337 teachers from eight middle schools located in two Southeastern United States school districts. These school districts are characterized as rural and rural/suburban. Included in the population was school district A, consisting of 209 teachers from three middle schools using Chromebooks as their one-to-one mobile device technology, and school district B, consisting of 128 teachers from five middle schools using iPads as their one-to-one mobile device technology. All middle-school teachers (sixth through eighth grade) were invited to participate. The total number of participants sampled was 129 teachers. After removing incomplete surveys and unwilling participants, the final sample size for this study totaled 115, with 73 (63.48%) participants from district A and 42 (36.52%) participants from district B. The total number of online surveys completed in both districts was 115, which exceeded the required sample size of 100 participants for a medium effect-size at the .05 alpha level with a statistical power of .70 (Gall, Gall, & Borg, 2007, p. 145). The demographics for this sample included a total of 82.6% females ($N = 95$) and

17.4% males ($N = 20$) with a median age range between 31-50 years old with ages ranging from 21 to 61 plus years old. The participant sample consisted of 108 (94.74%) White, 5 (4.39%) Black or African American, 0.0 (00.0%) Asian, 0.0 (00.0%) Hispanic/Latino, and 2 (0.88%) Other. Among the participants, 30 (26.09%) reported having a bachelor's degree, and 85 (73.91%) reported having an advanced degree. 74 (64.35%) reported having a master's degree, 8 (6.96%) reported having a specialist degree, 3 (2.61%) reported having a doctorate degree. Of the participants, 32 (28.32%) reported their current teaching assignment as sixth grade, 44 (38.05%) reported seventh grade, and 39 (33.63%) reported eighth grade. 29 (25.44%) self-reported their current teaching subject area as math, 11 (9.65%) reported science, 27 (23.68%) reported language arts, 15 (13.16%) reported social studies, and 33 (28.07%) reported other. See Table 1 for participant teacher education and background and Table 2 for participant teacher demographics.

Table 1

Participant Teacher Education and Background

Characteristic	Category	Chromebook N	iPad N
Total Participants	Mobile Device	73	42
Teaching Experience	1-10 years	23	18
	11-20 Years	29	16
	21 years or more	21	8
Education	Bachelor's	17	13
	Master's	48	26
	Specialist	6	2
	Doctorate	2	1
Grade Level	6th Grade	18	14
	7th Grade	28	16
	8th Grade	27	12

Subject Area	Math	15	14
	Science	8	3
	Language Arts	16	11
	Social Studies	10	5
	Other Subjects	24	9
Comfort with Technology	Extremely Comfortable	43	25
	Somewhat Comfortable	24	15
	Neither	4	1
	Somewhat Uncomfortable	2	1
	Extremely Uncomfortable	0	0
Types of Technology Used	Computer/Laptop	72	42
	Tablet	43	39
	Smart Phone	66	40
	Smart Watch	25	12
	Other	5	1

Table 2

Participant Teacher Demographics

Characteristic	Category	Chromebook N	iPad N
Total Participants	Mobile Device	73	42
Age Range	21-30 years old	11	7
	31-40 years old	20	15
	41-50 years old	26	12
	51-60 years old	12	8
	61 years or older	4	0
Gender	Female	61	34

	Male	12	8
Ethnicity	White	68	40
	Black or African American	4	1
	Hispanic/Latino	0	0
	Asian	0	0
	Other	1	1

Instrumentation

For the purposes of this study, the Teacher Attitudes Toward Technology Integration

Scale (TATTIS) (Sahin et al., 2017) was used to measure teacher attitudes toward technology in

a one-to-one mobile device-integrated classroom. The TATTIS instrument is a self-assessment

questionnaire primarily used to measure teacher attitudes toward technology in a one-to-one

device-integrated classroom setting where either Chromebooks or iPads are used. See Appendix

A for the TATTIS instrument. The survey incorporated questions from the ''Faculty Attitudes

toward Information Technology'' created by the Texas Center of Educational Technology (1998)

and the ''Electronic E-mail Questionnaire'' created by M. Lynne Markus (1987) (as stated in

Sahin et al., 2017). Other questions were asked such as how long teachers have been in the

teaching profession, number of years they have taught in a one-to-one device-integrated

classroom, how comfortable they are teaching with technology, and the types of technology they

have for personal use. See Appendix A for Demographic Questions. High instrument reliability

for the twelve items was estimated using a calculation of Cronbach's alpha ($a = .929$) (Sahin et

al., 2017). Permission to use and modify the instrument was requested from the authors and

permission was provided through email exchange. See Appendix B for permission to use and

modify instrument.

The TATTIS survey is comprised of a 12-question, Likert-type questionnaire. For each question, the participant can select a range from strongly disagree (1) to strongly agree (5). The minimum score for the survey is 12 and the maximum score is 60 with no sub-scales or reverse-scored questions. A high score meant that the teachers had a more positive attitude toward technology integration whereas a low score meant they had a more negative attitude toward technology integration. The additional demographic and teaching-related questions were not part of the scoring solution. The instrument was delivered online through each school districts' email system, using a link to the survey tool Qualtrics. The time to complete the survey instrument, including demographic information questions, was calculated and reported to be approximately ten minutes.

Procedures

The following procedures were used during this research study to administer the survey questionnaire and collect data through the online program, Qualtrics. Before commencing the study, the researcher obtained approval from the university's Institutional Review Board (IRB). See Appendix D for approval to conduct this study. The researcher also contacted the district superintendents through district technology coordinators to gain permission to conduct research with their middle-school teachers. See Appendix C for district permissions.

The researcher developed an electronic version of the TATTIS survey questionnaire using Qualtrics, an online survey and research tool, which included an initial consent page in Qualtrics to allow the participant to agree to participate or "op-out" of the survey. See Appendix E for teacher consent page. Instructions were also included for completing the survey, including the approximate completion time. Throughout the survey process, the participant had the option

to exit the survey and terminate participation.

Upon IRB approval and district permissions, the researcher contacted the technology coordinators in each district to schedule the release of a recruitment email to participants. This email delivery began the survey administration and data collection window. The researcher allowed the district technology coordinators to communicate with middle-school teachers directly, and therefore, did not have access to participant email addresses. Included in the recruitment email were detailed instructions for the completion of the survey and an access link to the Qualtrics survey. The researcher activated the survey in Qualtrics before the recruitment email invitations were sent to all middle-school teachers in each district for participation. See Appendix F for email to teachers. Once the survey was completed, the participant submitted the survey to Qualtrics and ended their session. The researcher requested that a weekly reminder email be sent to participants by the district technology coordinators for two successive weeks. After the data collection window passed, the researcher closed the Qualtrics survey. The researcher analyzed the surveys for completion, and incomplete surveys were discarded. The data were then entered into SPSS and analyzed using SPSS software. The researcher also exported the survey data from Qualtrics and saved it securely on a computer. Lastly, the survey data was backed up on a USB drive and placed in a secure location where it will be kept for three years.

Data Analysis

Because this study was a causal-comparative study and examined attitudes relating to the mobile device used in a one-to-one integrated classroom, the researcher used an independent-samples *t*-test (*t*-test) to test the null hypothesis at the 95% confidence level. This statistical procedure is used to compare differences between two groups (Gall et al., 2007, p. 315). The

null hypothesis was tested to determine that no statistically significant difference existed between teacher attitudes toward technology integration and the type of mobile device used in the classroom (Chromebook or iPad), as measured by the TATTIS (Sahin et al., 2017).

Prior to conducting the *t*-test, the researcher began by screening the data. The researcher then checked for outliers using a box-and-whisker plot. The box-and-whisker plot generated by SPSS did not identify any outliers in the data. The assumption of normality of the dependent variables was tested using the Kolmogorov-Smirnov test (n > 50). The assumption of equal variance was tested using Levene's Test of Equality of Error Variance. Effect size was addressed using Eta Squared to determine the magnitude of the relationship between the mean differences on the dependent variables. Descriptive statistics were computed.

Chapter Four: Findings

Overview

The purpose of this non-experimental, causal-comparative study was to investigate the difference in attitudes of middle-school teachers based on the mobile device used in their classrooms. A convenience sample of 115 teachers from two school districts in the Southeastern United States provided the data for this study. This study sought to address the gap in literature regarding the differences in positive or negative attitudes toward technology between teachers that use Chromebook mobile devices and teachers that use iPad mobile devices in their classroom environment. This chapter will provide an overview of the research question and null hypothesis that is the basis for this study. This chapter will also discuss the research findings, descriptive statistics and results from the data.

Research Question

RQ1: Is there a difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale?

Null Hypothesis

H$_0$1: There is no statistically significant difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale.

Descriptive Statistics

Data obtained for the dependent variable, teacher attitude for the independent variable, mobile device (Chromebook or iPad) can be found in Table 3. The Teacher Attitude Toward

Technology Integration Scale survey consists of 12 questions measured on a Likert scale, with a minimum score of 12 and a maximum score of 60. There were an unequal number of participants in each group of the independent variable mobile device; Chromebook teachers ($N =$ 73) and iPad teachers ($N = 42$). Chromebook teachers had a slightly higher mean attitude score and higher standard deviation ($M = 42.78$, $SD = 11.22$, $SE = 1.31$) than iPad teachers ($M = 42.12$, SD 9.71, $SE = 1.50$). Therefore, Chromebook teachers had a slightly more positive attitude than iPad teachers.

Table 3

Teacher Attitude

	Descriptive Statistics				
		N	Mean	Std. Deviation	Std. Error Mean
Composite	Chromebook	73	42.78	11.22	1.313
	iPad	42	42.12	9.71	1.498

Results

Data screening. Data screening was conducted on the dependent variable (teacher attitude) regarding data inconsistencies, outliers, and normality. The researcher sorted the data on each variable and scanned for inconsistencies. No data errors or inconsistencies were identified. Data screening included box-and-whisker plots to identify outliers on the dependent variable, teacher attitude. No outliers were identified. See Figure 2 for box-and-whisker plot.
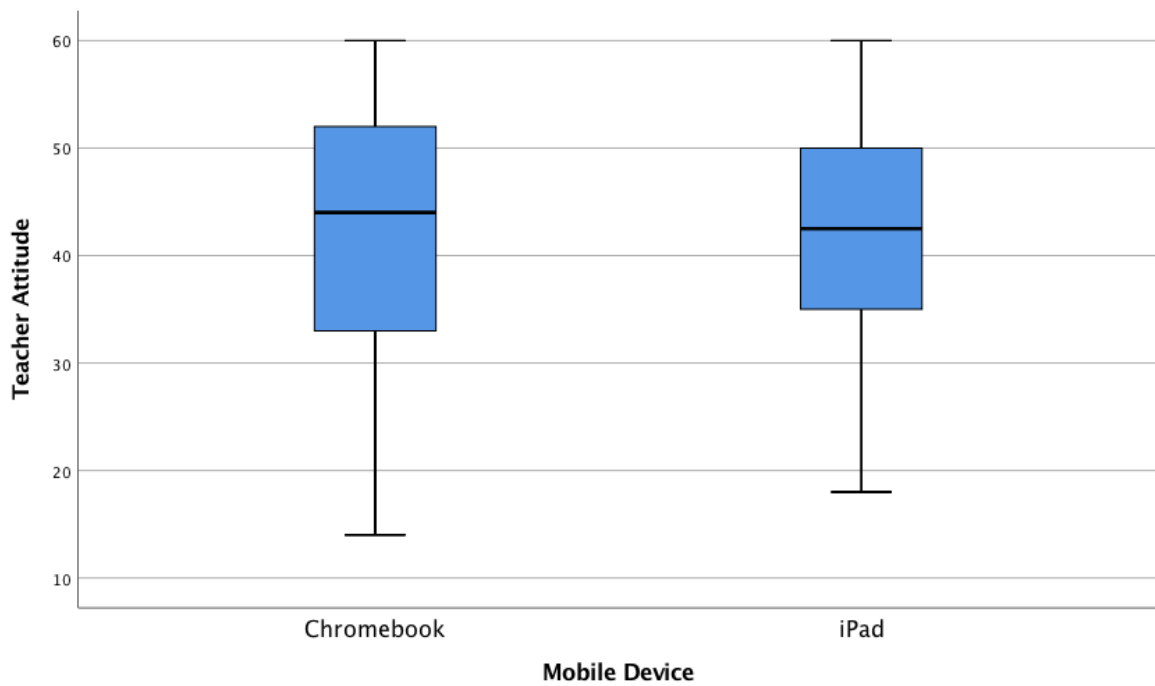
Figure 2. Box-and-whisker plot

Assumptions

A Kolmogorov-Smirnov test was used to examine normality. The Kolmogorov-Smirnov test was used with this sample ($N = 115$) because it is recommended when the sample size is greater than 50. No violations of normality were found. See Table 4 for Kolmogorov-Smirnov test.

Table 4

Tests of Normality

		Kolmogorov-Smirnov		
	Mobile Device	Statistic	df	Sig.
Teacher Attitude	Chromebook	.096	73	.093
	iPad	.109	42	.200

The assumption of homogeneity of variance was examined using the Levene's Test for Equality of Variances. The assumption of homogeneity of variance was met due to the fact that the significance value was ($p = .226$). Therefore, the homogeneity of variances was met. See Table 5 for Levene's Test.

Table 5

Levene's Test for Equality of Variances

		F	Sig.
Teacher Attitude	Equal variances assumed	1.479	.226

Results

An Independent-Samples *t*-test was used to test the null hypothesis; the differences in teacher attitude between Chromebook and iPad mobile device groups. In this sample, a total of 115 respondents were surveyed. Of that total, there were 73 teachers using the Chromebook mobile device and 42 teachers using the iPad mobile device. At a confidence level of 95%, the null hypothesis failed to be rejected where $t(113) = 0.319$, $p = .750$, $\eta^2 = .034$. See Table 6 for *t*-test for Equality of Means. The effect size was medium. Therefore, there was not a statistically significant difference in attitude scores between Chromebook teachers ($M = 42.78$, $SD = 11.22$) and iPad teachers ($M = 42.12$, $SD = 9.71$).

Table 6

Independent-Samples Test

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
		\multicolumn{6}{l}{*t*-test for Equality of Means}	95% Confidence Interval of the Difference	
Teacher Attitude	Equal variances assumed	.319	113	.750	.662	2.072	-3.442	4.766
	Equal variances not assumed	.332	95.959	.740	.662	1.992	-3.293	4.616

Chapter Five: Conclusions

Overview

This chapter will detail the results of the study and how related literature helped provide the context for a practical approach to findings that would serve to be potentially useful to teachers, school districts, and other researchers, as well as add to the existing body of literature in this field of study. This chapter will also discuss the implications and limitations of the study, concluding with recommendations for future research.

Research Question

RQ1: Is there a difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale?

Null Hypothesis

H_01: There is no statistically significant difference in attitudes toward technology integration among teachers who use either Chromebook or iPad mobile devices in their one-to-one middle-school classrooms, as measured by the Teacher Attitudes Toward Technology Integration Scale.

Discussion

The purpose of this non-experimental, causal-comparative study was to investigate the differences in attitudes among middle-school teachers based on the mobile device used in their one-to-one integrated classroom environment. Technology plays a very important role in the modern classroom, and the integration of this technology, based on current trends, has begun to both help and hinder curriculum design, lesson delivery, and student engagement. As the classroom climate transforms into a more technology-enhanced environment with increased

device availability, there is an ever-growing need to understand how attitudes among teachers may be influenced by using these devices in the classroom. The positive attitude of teachers toward the adoption and integration of technology is significant to its successful implementation as an effective educational tool for teachers and students alike (Botha & Herselman, 2015). Since positive attitudes often develop over time with users' continual increase in knowledge, understanding, training, and competency with technology systems, it is important to study and research the connection between attitude and the effectiveness of technology integration. In order for teachers to develop self-efficacy in technology integration, they require a positive attitude and strong motivation (Rehmat & Bailey, 2014). Although teachers often have positive beliefs and attitudes about using technology to support student-centered learning, their actual instructional practices do not always reflect those beliefs (Gunter & Reeves, 2017). Due to many factors such as training, infrastructure, technical support, and software availability, classroom integration may be successful or may be hindered, which will, ultimately, affect the overall positive or negative attitude of the teacher.

The review of literature indicated that technology integration is a powerful initiative for supporting instruction and preparing students for 21st century technological literacy. The implications and concerns among researchers suggested that teacher attitudes were often a determining factor to the success or failure of technology integration in their classrooms, and that other factors also provided varying degrees of influence on this integration. To determine if there was a causal relationship in this study, data was collected from eight middle schools within two school districts in the Southeastern United States. Random selection of participants was not possible; therefore, the data was collected through convenience sampling of participants in naturally occurring groups from the middle schools within their respective school districts. The

sample size included 73 (63.48%) teachers from District A and 42 (36.52%), teachers from District B, for a total of N = 115 participants. The total participation constituted 34% of all teachers from the eight middle schools.

Once the data from the study was analyzed and reviewed, the results indicated that there was not a statistically significant difference between teacher attitude scores between the Chromebook and the iPad groups, suggesting that the mobile device used in the classroom did not pose a substantial influence on the overall positive or negative attitude of the respective teacher. Upon evaluation of the independent variable, the mobile device used, it was evident that the Chromebook teachers had a slightly higher mean attitude score, with a higher standard deviation (M = 42.78, SD = 11.22, SE = 1.31) than iPad teachers (M = 42.12, SD = 9.71, SE = 1.50). This overall mean difference indicated that the attitude score of teachers who used Chromebooks was 0.66 higher than teachers who used iPads, and though the mean difference between the groups was small, the larger standard deviation for Chromebook users revealed that they scored more widely than iPad users. Based on the analysis of the data, the null hypothesis failed to be rejected in this study.

Though this study did not find a significant difference in attitude between the participant groups, there were some interesting observations from the data. Based on other studies that seemed to indicate a more negative attitude from teachers when they integrate mobile technology in their classrooms, it would seem that the magnitude and direction of teachers' attitudes has begun to make a shift toward one that is more positive than negative. This would suggest that teachers are becoming more accepting of technology integration in the classroom. Additionally, as the influence and importance of technology integration training continues to become a priority in teacher preparation programs, teachers are now entering the education profession with better

knowledge, understanding, and confidence in these technologies. It is possible that this preparation has helped to develop an increased level of patience and self-efficacy among the teachers that use these devices. This, therefore, may influence perceptions associated with integration, allowing teachers within their educational community to overcome potential obstacles that would hinder a positive attitude. Howard (2013) concluded that perceived risk, dread and anxiety, rather than just attitude may cause a teacher's aversion to technology integration and use in their classroom. Hung and Jeng (2013) indicated that attitude played a critical role in predicting the intention to participate in technology integration. Another study suggested that the overall positive or negative attitude of a teacher had a significant impact on the effective use of technology in their classroom (Blackwell et al., 2016).

Though many studies have been conducted related to attitudes, there is limited data available connecting teacher attitudes to the implementation of one-to-one device technology in the classroom. Although this potential gap in literature has been explored to some degree, there remains insufficient research to equate the results of this study effectively to other educational institutions or to a broader population. The results of this study are, however, supported by a recent study by Young (2016), stating that teachers' attitudes were broadly positive toward technology integration. Young's research suggests a positive disposition toward technology with the usage of iPads by teachers, though tempered with residual concerns about their confidence, competence, and changes in classroom practice as iPad projects developed (Young, 2016). A more recent study indicated that teachers who use Chromebooks in their classroom had a significant decrease in attitude towards technology after use over time (Sahin, Top, & Delen, 2017), as well as another study where results contended that teachers did not have highly enthusiastic attitudes when using iPads in their classroom (Vu, McIntyre, & Cepero, 2014). Past

studies agree that teachers' attitudes toward technology have often been a strong predictor of technology integration in classroom instruction (Capo & Orellana 2011; Howley et al. 2011; Miranda & Russell 2012).

Implications

Based on the final analysis and results of the data from this research study, the overall outcome revealed some interesting observations. When making a determination about this study, careful consideration should be given to the method of research and the participant population. Considering the complexities in the evaluation of attitudes and the impact other factors often have on whether the attitude is mostly positive or negative, this study addressed only the basic connection between the attitude of teachers, how it related to technology integration, and the influence it might have on factors such as mobile devices, curriculum design, and classroom instruction. Because of the size and scope of this study, generalizations to larger populations or demographics could not be made directly from the results. Although this study did not find a significant difference in attitude scores between the mobile device groups, it revealed some potential changes occurring in the attitudes of teachers who work in technology-integrated classrooms. In some of the more recent studies (Sahin et al., 2017; Vu et al., 2014), the perceived attitudes among teachers in these areas of technology integration have not been very positive. Therefore, as integration strategies continue to change and mature in order to stay current with societal trends, and as teachers receive updated training and professional development in the use of these technology systems, attitudes might begin to improve and increasingly move in a more positive direction, as Young suggested (2016).

The results of this study could not only benefit education as a whole but could also benefit school districts and school administrators as they confront the overwhelming task of

planning, procuring, and implementing technology in their district classrooms. The difficulty of integration in this setting is the degree of engagement among personnel regarding technological advancements, so that everyone from the principal, to the teacher, to the student will have equal access, training, and support during instruction. This requires forethought and observation within the schools. It also requires the administration to take into account the needs, goals, expectations, time allowance, and attitudes of the classroom teachers who will be on the front lines of integration initiatives.

These studies do not suggest that training is the only factor in this directional change. As society becomes more dependent on technology for everyday functions, and as technology continues to permeate personal as well as professional lives, influences on teachers' self-efficacy, perception, confidence, knowledge, skill, and behavior have begun to adapt as well. There are few teachers who enter the education profession without a basic technological foundation and moderate degree of digital literacy training. This influx of digitally trained teachers could begin to change the technological climate of a school environment as they positively influence their professional community of teachers and administrators.

It should be noted that this study could add to the body of research and possibly motivate other researchers to continue studying areas of attitude and potentially expand research to include other factors such as perception, self-efficacy, motivation, confidence, and technical training. As new studies are developed and new research related to teachers' attitudes are completed, the overall body of evidence in this area will increase, improving the way researchers discover new connections and relationships between mobile device integration and educators in the public-school system. Educators should also consider the findings of this study helpful as they develop new strategies for integration and training for teachers. Taking teachers' attitudes

into account during training may help to increase the effectiveness and reception of new ideas and technologies in the classroom.

<div align="center">**Limitations**</div>

Several limitations related to this study were observed during the research process. The initial limitation to this study related to the sampling method and site opportunities. The sample size in this study was directly limited to the number of potential participants, number of participating schools, and number of participating school districts. Of the eight potential school districts considered, only two specifically met the criteria for this study, which restricted overall population sampling. There were also logistical and resource limitations for the researcher as well, which minimized the potential sampling pool and geographical region. The participating school districts were chosen because of their overall similarities, sizes, and current one-to-one mobile device integration plans. District A used Chromebooks exclusively in their middle-school classrooms, whereas District B used iPads. This difference allowed for a population consisting of two distinct groups in the study and thus supported the *t*-test assumption requirement for independence of observations. The researcher observed from the data that the population was not very diverse. The participants were mostly white, with very few black/African American, Asian, or Hispanic/Latino teachers participating. The participants were also mostly women (83%) versus men (17%) in the population.

Allowing for these distinct groups led to another limiting factor causing the researcher to use only middle-school teachers as the participant population. This greatly decreased the number of potential candidates for the study and the ability to generalize findings to a larger population from the study. This limitation was imposed due to each district implementing differing technologies in their elementary, middle, and high school grades. District A used Chromebooks

in middle and high school grade levels, but iPads were used at the elementary level. District B used iPads in the elementary and middle school grade levels, but Chromebooks were used at the high school level. The discontinuity of mobile devices may have created structurally unequal groups among participants, which may have produced skewed results within the data.

The two districts used in the study had similar, but not identical, data collection windows. The recruitment email information was sent to both district technology coordinators at the same time to be distributed to all middle-school teachers within their respective districts. District A distributed the email immediately; District B did not distribute the email until the following week. This time differential allowed for influences from calendar events within each district. Because of communication obstacles, District B began collecting data one week after District A began and district B's data collection appeared to overlap their annual testing window, limiting teachers' access to email during the school day and inhibiting overall teacher participation within that district.

Another limiting factor was that the overall participation among teachers was not equivalent between districts. The participation in District A was almost twice the participation in District B. This difference lessened the researcher's confidence in the reason for limited participation in District B. In addition to calendar events, participation may have been hindered by communication obstacles during the data collection window. The researcher attempted to establish regular communication with each district in order to minimize the effects of the limitation.

Recommendations for Future Research

There were no quantitative studies found by the researcher that examined the relationship between teachers' attitudes and different mobile devices being used. Rather, studies typically

examined only one type of device, but not multiple devices. Other mobile device options often used in one-to-one integrated or BYOD environments, beyond Chromebooks and iPads, were not included. Additionally, these studies did not include other factors such as self-efficacy, comfort with technology, or training.

In light of the results and limitations of the current study, the researcher would recommend the following for future research opportunities:

1. Replicate this study to include a more diverse population of school districts, and a broader range of grades, such as high school and elementary school classrooms.

2. Broaden this study to include factors related to one-to-one technology integration such as teacher self-efficacy, comfort with technology, and training, along with attitude.

3. Conduct a qualitative or mixed-methods study to allow for teacher self-reporting of factors such as obstacles, hindrances, and supports that might affect overall attitude to determine if a correlation exists among these factors, and how they contribute to an overall positive or negative attitude among teachers.

4. Conduct a deeper quantitative study that accounts for demographic areas such as age, gender, and experience, seeking to examine how these areas relate and influence teacher attitudes.

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APPENDIX A: DATA COLLECTION INSTRUMENT

Teacher Attitudes Toward Technology Integration Survey
(Sahin, Top, & Delen, 2017)
(Modified to target Chromebook and iPad mobile devices)

Please read each statement below and then select the number that best describes or relates to your experiences in a one-to-one (1:1) mobile device integrated classroom using either Chromebooks or iPads.

5	4	3	2	1
SA=Strongly Agree	A=Somewhat Agree	U=Neither Agree nor Disagree	D=Somewhat Disagree	SD=Strongly Disagree

	SA	A	U	D	SD
1. I think that working with mobile device technology is enjoyable and stimulating.	5	4	3	2	1
2. The use of mobile device technology makes the student feel more involved.	5	4	3	2	1
3. The use of mobile device technology helps provide a better learning experience.	5	4	3	2	1
4. The use of mobile device technology makes the course more interesting.	5	4	3	2	1
5. The use of mobile device technology helps the student learn more.	5	4	3	2	1
6. The use of mobile device technology increases motivation for the course.	5	4	3	2	1
7. More courses should use mobile device technology to disseminate class information and assignments.	5	4	3	2	1
8. The use of mobile device technology creates more interaction between students enrolled in the course.	5	4	3	2	1
9. The use of mobile device technology creates more interaction between student and instructor.	5	4	3	2	1
10. Mobile device technology provides better access to the instructor.	5	4	3	2	1
11. Mobile device technologies are an effective means of disseminating class information and assignments.	5	4	3	2	1
12. I prefer using mobile device technology to traditional class handouts as an information disseminator.	5	4	3	2	1

Demographic Information

Please answer the following demographic and teaching related questions.

1. Please indicate the primary one-to-one mobile device technology that you currently use in your classroom.
    A. Chromebook
    B. iPad

2. How long have you taught with this current mobile device? (Years) _____

3. How long have you taught in a one-to-one device integrated classroom? _____ (Years)

4. How long have you been in the teaching profession? (Years) _____

5. What is your comfort level when teaching with technology?
    A. Very Uncomfortable
    B. Uncomfortable
    C. Neither Comfortable nor Uncomfortable
    D. Comfortable
    E. Very Comfortable

6. Which technologies do you use personally and professionally?
    (Select all that apply)
    A. Computer
    B. Tablet
    C. Smart Phone
    D. Smart Watch
    E. Other

7. What is your Age? (Range)
    A. 21-30 years old
    B. 31-40 years old
    C. 41-50 years old
    D. 51-60 years old
    E. 61 years or older

8. What is your Gender?
    A. Female
    B. Male

9. What is your Ethnicity?
    A. White
    B. Black or African American
    C. Hispanic/Latino

        D. Asian
        E. Other

10. What primary subject do you teach?
        A. Math
        B. Science
        C. Language Arts
        D. Social Studies
        E. Other

11. What grade level do you teach?
        A. 6th Grade
        B. 7th Grade
        C. 8th Grade

12. What is your highest degree awarded?
        A. Bachelor's
        B. Master's
        C. Specialist
        D. Doctorate

APPENDIX B: PERMISSION TO USE, MODIFY, AND PUBLISH INSTRUMENT

Permission to Use and Modify Instrument

Re: Permission to use the Teacher Attitudes Towards Technology Scale

Alpaslan Sahin ▮▮▮▮▮▮▮▮▮▮▮▮▮▮
To: Mosley, Gary
On: Friday, June 30, 2017 at 12:10 PM
Hide Details

Hi,

I think it should be fine to use the instrument. Also, you can change the wording if you think that will help.
Good luck!
Alpaslan

Permission to use the Teacher Attitudes Towards Technology Scale

Mosley, Gary
To: ▮▮▮▮▮▮▮▮▮▮▮▮▮▮
On: Friday, June 30, 2017 at 7:34 AM
Hide Details

Hi Dr. Sahin.

I am a doctoral student at Liberty University in Lynchburg, VA. I am currently working on my dissertation proposal for my Doctor of Education degree. My title is "THE DIFFERENCES BETWEEN TEACHERS ATTITUDES TOWARD TECHNOLOGY WHO USE CHROMEBOOKS OR IPADS IN THEIR CLASSROOM" and my population is Public Secondary School Teachers in South Carolina, U.S.A.

I am writing with a request to get permission to use the **Teacher Attitudes Towards Technology Scale** that you and others developed and used in TEACHERS' FIRST YEAR EXPERIENCE WITH CHROMEBOOK LAPTOPS AND THEIR ATTITUDES TOWARDS TECHNOLOGY INTEGRATION. Also, I am trying to gain permission to make a small change in the wording in each question to remove the "Before" and "After" statements relating to Chromebook distribution.

I thank you for your attention to this email and my request for this permission. I will be happy to share any data and results with you after the study is performed and my dissertation is completed.

Thank you for your time. I look forward to hearing from you soon with this request.

Gary Mosley
Doctoral Student, School of Education
Liberty University (www.liberty.edu)
Email ▮▮▮▮▮▮▮▮▮▮▮▮
Cell ▮▮▮▮▮▮▮

Permission to Publish Instrument

AS

○ **Adam Sahin** ▮▮▮▮▮▮▮▮▮▮▮▮
○ Mosley, Gary
Monday, August 5, 2019 at 11:24 AM
Show Details

Congratulations!
Please go ahead and use it.
I'd love to take a look at your dissertation as well (whenever you want)

Thanks.
Adam

On Mon, Aug 5, 2019 at 10:16 AM Mosley, Gary ▮▮▮▮▮▮▮▮▮▮▮▮ wrote:

> Hello Dr. Sahin,
>
> As you can see in your pervious email, you gave me permission to use and modify your "Teacher Attitudes Towards Technology Scale" instrument in my research data collection and doctoral dissertation. I appreciate your willingness to allow me to use this instrument.
>
> I have now completed and defended my doctoral dissertation. As a part of my dissertation publication process, I need to secure permission to publish your instrument as a part of my dissertation manuscript. It has been included in the appendix section of the dissertation and I have cited you each time I have referenced the instrument.
>
> Do you give permission to me to publish your instrument within my dissertation?
>
> Again, I thank you for your attention.
>
> Dr. Gary Mosley
>
> Liberty University School of Education (www.liberty.edu)
>
> ▮▮▮▮▮▮▮▮▮

APPENDIX C: DISTRICT CONSENT TO CONDUCT RESEARCH

CONSENT TO CONDUCT RESEARCH STUDY

ANDERSON COUNTY SCHOOL DISTRICT FIVE

DIFFERENCES IN TEACHER ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN A ONE-TO-ONE MOBILE DEVICE MIDDLE SCHOOL CLASSROOM

This study is being conducted by Gary L. Mosley, Educational Doctorate Candidate.

District Administrator:

Teachers in your school district, specifically the middle school teachers in grades 6, 7, and 8, are invited to participate in a research study related to their attitudes toward technology integration when teaching with one-to-one mobile devices in their classrooms. Anderson County School District Five was selected as a possible study location because the middle schools in your district participate in a one-to-one Chromebook technology initiative and have a commitment to integrate this technology in those classrooms. Teacher attitudes in your district will be compared with teacher attitudes in another district that use one-to-one iPad devices in their classroom.

I ask that you read this form and ask any questions you may have before agreeing to be in the study.

Background Information:
As a graduate student in the Education Department at Liberty University, I am conducting research as part of the requirements for an Ed.D. in Curriculum and Instruction. The title of my research project is, *"Differences in Teacher Attitudes Toward Technology Integration in a One-to-One Mobile Device Middle School Classroom."* The purpose of this quantitative study will be to examine if there exists a significant difference in attitudes between middle school teachers from your district who use Chromebooks, and middle school teachers from another district who use iPads.

I am writing to request your permission to conduct my research in each of the middle schools in your district. The target population of the participants will be teachers who specifically teach in a one-to-one device classroom setting. All teachers will have an equal opportunity to participate in the study if they so choose and sign an assent form.

Procedures:
Participants will be asked to take part in the *Teacher Attitudes Toward Technology Integration Survey (TATTIS)*. The anonymous survey should take approximately five minutes to complete. The data will be used to identify differences in attitudes among teachers based on their use of either Chromebooks or iPads in their classroom. Teachers will be presented with informed assent information prior to participating.

Voluntary Nature of the Study:
Taking part in this study is completely voluntary, and participants may discontinue participation at any time.

Risks and Benefits
There are no anticipated risks with regard to your districts', schools', or teachers' participation in this study other than those encountered in day-to-day life. The benefits of the study will be to gain a better understanding between technology integration in the classroom and teacher attitudes toward technology with regard to one-to-one device initiatives.

Compensation:
You, or participating teachers, will not be compensated for your school district's participation in the study, but you will be provided with the descriptive statistics concerning teacher's attitudes with regard to one-to-one device integration within the classroom.

Confidentiality:
The survey will be anonymous, and all data collected will be kept private. Published reports will not include information that may make it possible to identify a subject. Research data will be stored securely and only the researcher will have access to the records. The survey data will be stored on a secure web site, and a backup copy will be placed on a secure, encrypted flash drive in a locked drawer.

Contacts and Questions:
Thank you for considering my request. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Mr. Mosley by phone at ▮▮▮▮▮▮ or by email at ▮▮▮▮▮▮▮. You may also contact Dr. Orlando Lobaina, advisor to Mr. Mosley, by phone at ▮▮▮▮▮ or by email at ▮▮▮▮▮▮.

Statement of Consent:
I have read and understood the above information. I have asked questions and have received answers. I consent to allow the researcher to conduct this study in Anderson County School District Five with middle school teachers in grades 6, 7, and 8.

Authorized Administrator of Anderson County School District Five:

Printed Name and Title: _Thoms A. Wilson_____

Signature ▮▮▮▮▮▮▮▮▮▮_____ Date: _3/14/19_____

Signature of Investigator: _▮▮▮▮▮▮▮▮_____ Date: _2/15/2019_____

You will be given a copy of this information to keep for your records.

CONSENT TO CONDUCT RESEARCH STUDY

ANDERSON COUNTY SCHOOL DISTRICT ONE

DIFFERENCES IN TEACHER ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN
A ONE-TO-ONE MOBILE DEVICE MIDDLE SCHOOL CLASSROOM

This study is being conducted by Gary L. Mosley, Educational Doctorate Candidate.

District Administrator:

Teachers in your school district, specifically the middle school teachers in grades 6, 7, and 8, are invited to participate in a research study related to their attitudes toward technology integration when teaching with one-to-one mobile devices in their classrooms. Anderson County School District One was selected as a possible study location because the middle schools in your district participate in a one-to-one iPad technology initiative and have a commitment to integrate this technology in those classrooms. Teacher attitudes in your district will be compared with teacher attitudes in another district that use one-to-one Chromebook devices in their classroom.

I ask that you read this form and ask any questions you may have before agreeing to be in the study.

Background Information:
As a graduate student in the Education Department at Liberty University, I am conducting research as part of the requirements for an Ed.D. in Curriculum and Instruction. The title of my research project is, *"Differences in Teacher Attitudes Toward Technology Integration in a One-to-One Mobile Device Middle School Classroom."* The purpose of this quantitative study will be to examine if there exists a significant difference in attitudes between middle school teachers from your district who use iPads, and middle school teachers from another district who use Chromebooks.

I am writing to request your permission to conduct my research in each of the middle schools in your district. The target population of the participants will be teachers who specifically teach in a one-to-one device classroom setting. All teachers will have an equal opportunity to participate in the study if they so choose and sign an assent form.

Procedures:
Participants will be asked to take part in the *Teacher Attitudes Toward Technology Integration Survey (TATTIS)*. The anonymous survey should take approximately five minutes to complete. The data will be used to identify differences in attitudes among teachers based on their use of either iPads or Chromebooks in their classroom. Teachers will be presented with informed assent information prior to participating.

Voluntary Nature of the Study:
Taking part in this study is completely voluntary, and participants may discontinue participation at any time.

Risks and Benefits
There are no anticipated risks with regard to your districts', schools', or teachers' participation in this study other than those encountered in day-to-day life. The benefits of the study will be to gain a better understanding between technology integration in the classroom and teacher attitudes toward technology with regard to one-to-one device initiatives.

Compensation:
You, or participating teachers, will not be compensated for your school district's participation in the study, but you will be provided with the descriptive statistics concerning teacher's attitudes with regard to one-to-one device integration within the classroom.

Confidentiality:
The survey will be anonymous, and all data collected will be kept private. Published reports will not include information that may make it possible to identify a subject. Research data will be stored securely and only the researcher will have access to the records. The survey data will be stored on a secure web site, and a backup copy will be placed on a secure, encrypted flash drive in a locked drawer.

Contacts and Questions:
Thank you for considering my request. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Mr. Mosley by phone at ███████ or by email at ███████████ You may also contact Dr. Orlando Lobaina, advisor to Mr. Mosley, by phone at ███████ or by email at ████████

Statement of Consent:
I have read and understood the above information. I have asked questions and have received answers. I consent to allow the researcher to conduct this study in Anderson County School District One with middle school teachers in grades 6, 7, and 8.

Authorized Administrator of Anderson County School District One:

Printed Name and Title: G.R. Binnicker, Superintendent

Signature: ███████████████ Date: 4/8/19

Signature of Investigator: ███████████ Date: 2/15/2019

You will be given a copy of this information to keep for your records.

APPENDIX D: IRB APPROVAL

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 1, 2019

Gary L. Mosley
IRB Exemption 3635.050119: Teacher Attitudes toward Technology Integration in a One-To-One Mobile Device Middle-School Classroom

Dear Gary L. Mosley,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(2), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at

Sincerely,

Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office
Liberty University | Training Champions for Christ since 1971

APPENDIX E: INFORMED CONSENT FOR PARTICIPANTS

The Liberty University Institutional
Review Board has approved
this document for use from
5/1/2019 to --
Protocol # 3635.050119

INFORMED CONSENT FOR PARTICIPANTS

TEACHER ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN A ONE-TO-ONE
MOBILE DEVICE MIDDLE-SCHOOL CLASSROOM

Gary L. Mosley Liberty University School of Education

You are invited to participate in a research study related to teacher attitudes toward technology integration. This study will compare the attitudes among teachers using mobile devices in their one-to-one integrated classrooms. You were selected as a possible participant because you are a middle-school teacher who specifically teaches in a one-to-one device classroom setting. Please read this form and ask any questions you may have before agreeing to participate in the research study.

Gary L. Mosley, a student/doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information: The purpose of this quantitative study is to examine whether a significant difference exists in attitudes between middle-school teachers from your district who use iPads, and middle-school teachers from another district who use Chromebooks in their classrooms.

Procedures: If you agree to be in this study, I would ask you to do the following:
1. Complete a short survey titled "*Teacher Attitudes toward Technology Integration.*" This is an anonymous survey and should take approximately ten minutes to complete.

Risks and Benefits: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life. Participants should not expect to receive a direct benefit from taking part in this study

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The survey will be anonymous, and all data collected will be kept private. Research data will be stored securely and only the researcher will have access to the records. The survey data will be stored on a secure, encrypted flash drive in a locked drawer. After three years, all electronic records will be deleted.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time, prior to submitting the survey, without affecting those relationships.

How to Withdraw from the Study: If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Gary L. Mosley. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Mr. Mosley by phone at ███████████ or by email at ███████████████ You may also contact Dr. Orlando Lobaina, advisor to Mr. Mosley, by email at ███████████████

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at ███████████

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

APPENDIX F: RECRUITMENT EMAIL TO PARTICIPANTS

April 2019

School District Middle-School Teachers

Dear Teachers:

As a graduate student in the Education Department at Liberty University, I am conducting research as part of the requirements for a Doctorate degree (Ed.D. in Curriculum and Instruction). The title of my research project is, *"Teacher Attitudes Toward Technology Integration in a One-to-One Mobile Device Middle-School Classroom."* The purpose of my research will be to examine if there exists a significant difference in attitudes among middle-school teachers from one district who use iPads, and middle-school teachers from another district who use Chromebooks in their classrooms. I am writing to invite you to participate in my study.

If you are a middle-school teacher who teaches in a one-to-one device integrated classroom setting, and you are willing to participate, you will be asked to complete a short survey titled *"Teacher Attitudes Toward Technology Integration."* It should take approximately ten minutes for you to complete the survey. Your participation will be completely anonymous, and any information requested as part of your participation, will remain completely confidential.

To participate, click on the following link to complete the survey:

Teacher Attitudes Toward Technology Integration Survey

A consent document is provided as the first page you will see after you click on the survey link. The consent document contains additional information about my research. Please click on the survey link at the end of the consent information to indicate that you have read the consent information and would like to take part in the survey. If you do not wish to continue, just exit the survey.

Thank you very much for your willingness to participate in this study.

Sincerely,

Gary L. Mosley
Doctoral Candidate
Liberty University
School of Education