TEACHERS AND 1:1 TECHNOLOGY IN CLASSROOM ACTIVITIES: A QUANTITATIVE STUDY COMPARING PERCEPTIONS AND STAGE OF ADOPTION

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ABSTRACT

This quantitative research study examined high school teachers' perceptions concerning the incorporation of 1:1 technology into classroom activities. The study collected data from teachers at rural, southeastern high schools with 1:1 technology programs. Data were collected from teachers via an online survey. The Technology Acceptance Model (Davis, 1989; Marangunic & Granic, 2015) was used as a basis for examining teachers' incorporation of 1:1 technology into class work. Teachers' adoption of the technology into pedagogy was analyzed to determine if relationships exist between level of adoption, perceptions of usefulness and ease of use, organizational factors, and teacher characteristics. Identification of relationships provided insights that may inform future decision-making about 1:1 technology integration into curricula and pedagogy, allowing opportunities for interventions that might influence adoption.

DEDICATION

This dissertation is dedicated to everyone who listened, advised, helped, comforted, consulted, tolerated, advocated, encouraged, and generally helped keep me on track throughout my doctoral journey and the multitude of simultaneously-occurring life experiences. Family, friends, classmates, instructors, and advisors all played a major role in my efforts, especially BDS, TST, BSD, SJS, MJM, RML, EGL, and EKC. Many thanks to you all. I promise to quit constantly interjecting ideas for dissertation research into conversations now.

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LIST OF ABBREVIATIONS

PEoU, Perceived Ease of Use

PU, Perceived Usefulness

SA, Stage of Adoption

TAM, Technology Acceptance Model

LIST OF SYMBOLS

ΔR^2, Adjusted R^2, Proportion of variation explained by the regression model in the population

F, Distribution variable

M, Mean

N, Sample size

p, Significance

r, Correlation coefficient

R^2, Proportion of variation explained by the regression model in the sample

CHAPTER I

INTRODUCTION

This dissertation describes a quantitative research study that examined high school teachers' perspectives concerning the integration of 1:1 technology into classroom activities. For the purposes of this study, 1:1 technology is defined as a classroom environment in which each student has a mobile learning device, such as a laptop computer, Chromebook, iPad, or tablet (Harper & Milman, 2016; Lowther, Ross, & Morrison, 2003). This chapter introduces the study.

Data were collected from high school teachers through an online survey instrument. The research was conducted in specific rural, southeastern high schools in which 1:1 technology is available for students' use in classroom activities. The researcher investigated possible relationships between teachers' reported levels of 1:1 technology adoption and perceptions of the usefulness and ease of use of 1:1 technology, organizational factors, and teacher characteristics.

A primary educational trend has featured consistent efforts by both educational reformers and policy-makers to integrate computers into educational practices (Harper & Milman, 2016; Inan, Lowther, Ross, & Strahl, 2010; Lowther, Inan, Ross, & Strahl, 2012; Toru, Ilgaz, Usluel, & Ankara-Turkey, 2006). The introduction of computers into public schools requires new pedagogical approaches for utilization within curriculum and instruction (Pollard & Pollard, 2004; Wentworth, Graham, & Tripp, 2008). Vygotsky and Cole (1978) noted that cultural tools, those items used by members of a given society, have a mediating quality on the organizational members who utilize them. Vygotsky (as cited in Moll, 2014) posited that human interactions

with artifacts, objects made by people for a practical purpose, act as "instrumental, or tool, mediation" (p. 31) in their users. The utilization of these mediating tools results in transformations in both humans and their environment (Moll, 2014). From a Vygotskian perspective, tools impact human activity. Therefore, the introduction of new tools, such as laptops into educational practices, will result in changes in participants (Zheng, Warschauer, Lin, & Chang, 2016), and "understanding the nature of that transformation is of great value" (Zheng et al., 2016, p. 2). An investigation into perceptions of laptop use in classroom activities may provide insights that might inform policies and decisions concerning educational use of these artifacts.

Teachers, as the classroom-level decision-makers, hold the key to the successful adoption of mobile learning devices into classroom activities (Alcoholado, Diaz, Tagle, Nussbaum, & Infante, 2016; Ciampa, 2014). According to Bebell and Kay (2010), "it is impossible to overstate the power of individual teachers in the success or failure of 1:1 computing" (p. 48). Therefore, examination of factors possibly impacting user acceptance of the innovation was deemed important in understanding the adoption of 1:1 technology into classroom pedagogies.

Background of the Study

It is projected that by 2021, there will be 1.5 mobile devices per capita and 11.6 billion mobile-connected devices, exceeding the 7.8 billion people anticipated to constitute the world population at that time (Cisco, 2017). This proliferation of mobile devices means that both teachers and students will be able to use mobile technology anytime and anywhere to access information and learning tools. Boundaries previously imposed by time and place are diminishing dramatically (Foulger, Waker, Burke, Hansen, Williams, & Slykhuis, 2013). Mobile

devices have changed - and will continue to change - the way society functions, and its educational practices are changing as well.

Since its introduction to society, technology has impacted education. Early proponents of technology use in education anticipated that student interest and achievement would increase as a result of students' access to computers (Keengwe, Onchwari, & Wachira, 2008b; Pollard & Pollard, 2004). School decision-makers believe that the incorporation of 1:1 technology into instructional methodology will lead to corresponding increases in student interest in learning activities, particularly among high school pupils (Howard, Chan, & Caputi, 2015; Inan & Lowther, 2010b; Lowther et al., 2003). Millennial students, those born between 1980 and the mid-2000's, have had access to the Internet throughout their formative years and therefore view it as an intrinsic part of daily life (Balda & Mora, 2011; Cabral, 2008). Research indicates that 98% of Americans between the ages of 13 and 29 use the Internet daily (Gernsbacher, 2014; Lenhart, Duggan, Perrin, Stelper, Rainie, & Parker, 2015), and more than half of teens go online multiple times on any given day (Lenhart et al., 2015). The ubiquitous nature of technology in the lives of this generation of students has led to the expectation that computer and Internet use will be beneficial tools in these learners' education (Chambers, 2014; Dündar & Akçayir, 2014).

National digital learning initiatives have featured reports that portray millennial students as digital natives: Internet-savvy, constantly online, and engaged by technology-based learning activities (Greenhow, Walker, & Kim, 2010; Woempner, 2007). Research indicates that this generation of students has different values, behavior, and characteristics than their predecessors (Eastman, Iyer, Liao-Troth, Williams, & Griffin, 2014; Eastman & Liu, 2012; Gernsbacher, 2014; Gurau, 2012). The first "high-tech generation" (Norum, 2003), millennials have grown up with ubiquitous technology at the core of their socialization, expectations, and experiences

(Eastman et al., 2014). Millennials are accustomed to the role of technology, and as digital natives, they are expected to be not only comfortable with, but also enthusiastic about, the use of technology in every aspect of life (Eastman et al., 2014; Gu, Zhu, & Guo, 2013; Woempner, 2007).

This societal trend has encouraged state and national planning groups, educational leaders, and policy makers to promote the incorporation of 1:1 technology into classroom activities (Hop & Delver, 2011; Howley, Wood, & Hough, 2011; Roehl, Reddy, & Shannon, 2013). According to Johnson, Levine, Smith, and Smythe (2009), "technology is increasingly a means for empowering students, a method for communication and socializing, and an [sic] ubiquitous, transparent part of their lives" (p. 6). Public schools are being called to utilize the power and potential of digital content "to leverage the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures" (United States Department of Education, 2010). Such pronouncements have led educational reformers, administrators, and stakeholders to posit that incorporation of technology is not only beneficial, but also essential, to students in millennial classrooms (Black, 2010; Howley et al., 2011; Keengwe, Schnellert, & Jonas, 2014).

State governments have also emphasized the need for technology integration into classroom practices, mandating digital literacy objectives as part of their learning standards (Dalton, 2012; Howley & Howley, 2008). The standards are written with the expectation that teachers will be both willing and able to incorporate technology into pedagogies (Dalton, 2012). State objectives include explicit college and career readiness goals that announce the expectation that public school graduates will have the ability to "use technology and digital media strategically and capably" (Introduction to Tennessee's state standards for English language arts

& literacy in history/social studies, science, and technical subjects, 2016, p. 5). High school students are expected to use technology skills for research, writing, publishing, and creating presentations in preparation for their futures ("Common Core State Standards," 2012; Drew, 2012; Johnson et al., 2009; Pantazis, 2002; Tinker, Galvis, & Zucker, 2007). Teachers are called to address these standards via their curricula, producing students who can effectively use technology in higher education and future employment (Keengwe, Onchwari, & Wachira, 2008a). The incorporation of 1:1 technology into classroom activities is expected to captivate the attention of millennial students, increase their interest in learning (Hora & Holden, 2013; Roehl et al., 2013), and improve their digital proficiency (Grimes & Warschauer, 2008; Lowther et al., 2003; Tinker et al., 2007).

Despite expectations for integration of 1:1 technology into pedagogies, not all teachers have embraced the opportunity when school systems have made personal learning devices available for student use during class activities. Public schools have invested over 200 million dollars into technology (Johnson, 2012), expending funds on hardware, software, infrastructure, and personnel. Despite financial expenditures by their school systems, few teachers have added 1:1 technology use into curriculum activities in ways that positively affect students' learning experiences (Tallvid, 2016). Research is needed, then, about the realities of incorporating 1:1 technology use into classroom activities, due to these initiatives being met by teachers with varying degrees of acceptance (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010). According to Keengwe and Schnellert (2012), much-needed technology integration into instruction has not increased correspondingly alongside growing numbers of readily available instructional technology tools.

Every innovation is accompanied by some degree of resistance to its adoption (Morris, 2011; Rogers, 2003). The integration of 1:1 technology into classroom activities is no exception, despite the ubiquitous use of technology in people's daily activities (Howard & Gigliotti, 2016). "The introduction of any new [classroom] strategy requires a shift in the minds of both educators and students" (Roehl et al., 2013, p. 48). As the change agents who will either promote or reject the innovation (Akman & Turhan, 2015; Christensen, Horn, & Johnson, 2011; Morris, 2011), teachers hold the key to the success of its adoption. According to Rogers (2003), adoption of an innovation is based on willingness to accept change, and the decision to accept or refuse the change is based on perceptions of relative advantage, compatibility, complexity, trialability, and observability.

According to the Diffusion of Innovation Theory (Rogers, 2003), teachers asked to integrate 1:1 technology into their curriculum will evaluate the option based on several factors: if it appears to be a better approach than their current methodology; if it corresponds with their personal values, past experiences, and needs; if it appears to be relatively easy to use; if it can be attempted on a trial basis; and if other teachers have successfully utilized it. Some teachers have chosen to be early adopters, quickly accepting 1:1 technology as a tool through which their students' learning might be facilitated. However, there is a line of movement through which innovations are diffused, according to Rogers (2003), and at the opposite end of the spectrum from early adopters and those who adopt soon thereafter, are the reluctant and the recalcitrant. With the recognition that some teachers more readily accept 1:1 technology as part of their classroom pedagogies than others, an investigation into reported stages of adoption, factors characterizing the various groups of adopters, and teacher perceptions could reveal what progress, if any, has occurred thus far in mindset shifts toward acceptance of the innovation.

Statement of the Problem

Proponents of technology use in education posit that providing 1:1 technology for student use will be beneficial in classroom learning activities, and therefore, teachers should be motivated to adopt the tool and incorporate it into their curricula (Grimes & Warschauer, 2008; Lowther et al., 2012; Roehl et al., 2013). Teachers of the millennial generation not only have to teach subject matter, but must also combat the growing problem of student apathy toward education (Cutler, 2007). According to technology advocates, use of 1:1 technology will counteract student passivity by equipping them with the capability to readily access information, conduct research, organize assignments, and collaborate with peers (Mouza, 2008). Improvements in academic achievement, technology equity, student interest, and communication capabilities have been identified as positive aspects of 1:1 technology initiatives (Grant, Ross, Wang, & Potter, 2005; Holcomb, 2009). However, despite these reported benefits, many teachers remain reluctant to change existing practices to include use of mobile learning devices as part of classroom activities (Al-Zaidiyeen, Mei, & Fook, 2010; Grant et al., 2005; Howley et al., 2011; Tallvid, 2016).

The integration of 1:1 technology into instructional pedagogies is directly related to teachers' willingness to accept the change (Knezek & Christensen, 2016; Sahin, Top, & Delen, 2016). Based on the Technology Acceptance Model (TAM), teachers' integration of digital devices into students' class work is dependent on their perceptions of the tool's usefulness and ease of use (Davis, 1989; Montazemi & Qahri-Saremi, 2015). Teachers' adoption of 1:1 technology was examined in this study in relation to their attitudes toward use of digital devices during class, organizational factors, and teacher characteristics (Lowther, Inan, Daniel Strahl, & Ross, 2008). Providing teachers and students with digital devices for class use is merely one step

in the process of integrating 1:1 technology into curriculum and pedagogies (Silvernail & Buffington, 2009). The investigation into teachers' perspectives concerning 1:1 technology integration into curriculum and pedagogies revealed insights into the realities of their acceptance of the changes accompanying the initiative.

Research Questions

In this study, the researcher sought to explore the current case of several teachers experiencing the same phenomenon. The study focused on the following central research questions:

Research Question 1:

Is there a relationship between teachers' reported perceptions of the usefulness of 1:1 technology in classroom activities and teachers' stage of its adoption into classroom activities?

Research Question 2:

Is there a relationship between teachers' reported perception of 1:1 technology's ease of use and teachers' stage of adoption of the 1:1 technology in classroom activities?

Research Question 3:

Is there a relationship between organizational factors and teachers' stage of adoption of 1:1 technology in classroom activities?

Research Question 4:

Is there a relationship between teacher characteristics and teachers' stage of adoption of 1:1 technology in classroom activities?

Research Hypotheses

To address the research questions, the following hypotheses were tested:

Hypothesis 1:

There is a significant relationship between teachers' perceptions of the usefulness of 1:1 technology in classroom activities and stage of adoption.

Hypothesis 2:

There is a significant relationship between teachers' perception of the ease of use of 1:1 technology in classroom activities and stage of adoption.

Hypothesis 3:

There is a significant relationship between organizational factors and teachers' stage of adoption of 1:1 technology in classroom activities.

Hypothesis 4:

There is a significant relationship between teacher characteristics and stage of adoption of 1:1 technology in classroom activities.

Purpose of the Study

The purpose of this quantitative research study was to explore the attitudes of teachers when 1:1 technology is made available for integration into classroom activities. An investigation into teachers' stages of adoption and their perception of the usefulness and ease of use of 1:1 technology, their views of organizational support, and teacher characteristics provided information that may be used to inform decisions related to improving students' learning opportunities and to utilizing funds more effectively.

This quantitative study was conducted in rural, southeastern high schools and provided insights into the experiences of those most directly involved in the integration of 1:1 technology use into class activities: the teachers expected to facilitate learning via the tool. Teachers' perceptions of incorporating 1:1 technology into pedagogies will either encourage or discourage their adoption of the innovation (Davis, 1989; Slakmon & Schwarz, 2014). The data collected in this study may inform administrators contemplating identification of early adopters (Bandura, 2006; Rogers, 2003) to act as mentors to others. Decision makers may also use the results to determine if specific groups of hesitant adopters need encouragement (Howard & Gigliotti, 2016). The study's data analysis may inform decisions concerning the creation of mentoring programs or the development of modeling opportunities to demonstrate the tool's effectiveness and thereby promote greater acceptance (Bandura, 2006). Data pertaining to those teachers who have most completely adopted 1:1 technology into classroom activities may provide insights that prove helpful in improvement of instructional design (Rothwell & Kazanas, 2008). This study helped fill a gap in the literature by investigating teachers' adoption of 1:1 technology, using the Technology Acceptance Model (TAM) to determine perceptions of the usefulness and ease of use of 1:1 technology computers (Davis, 1989; Marangunic & Granic, 2015). It provided information about relationships between stage of adoption and organizational and teacher characteristics that may be helpful to future researchers.

Professional Significance of the Study

This study examined the integration of 1:1 technology into classroom methodology through the unique lenses provided by the teachers expected to utilize the tool. Research posits that teacher beliefs are a critical factor in the adoption of technology into the educational

environment (Christensen & Eyring, 2011; Christensen et al., 2011; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Inan & Lowther, 2010a, 2010b; Lei & Zhao, 2008). Technology purchased for classroom use is largely underutilized (Barrow, Markman, & Rouse, 2009; Keengwe et al., 2008a; Lim & Chai, 2008), with researchers noting that "past investments have failed to produce the hoped for results" (Christensen et al., 2011, p. 65). This research study revealed potential areas of need that, given attention, might increase teachers' utilization of school systems' investments and benefit students' learning. When school leaders launch initiatives requiring teachers to change pedagogies, it is essential that they orient teachers and help them "navigate this continuum and guide them through the process of integrating conventional resources, which are already familiar to them, with . . . technology" (Nussbaum & Diaz, 2013, p. 493).

Researchers posit that the introduction of 1:1 technology into instructional methodology results in greater student interest in classroom activities and improved ability to meet state learning standard objectives (Hora & Holden, 2013; Keengwe et al., 2014; Lowther et al., 2012; Mouza, 2008). Teachers' willingness to restructure curriculum to incorporate student use of 1:1 technology into classwork is a key factor in the success of the adoption of the learning tool (Howard & Gigliotti, 2016). Technology integration into class work may be related to teachers' ideas about how easily it can be accomplished and how beneficial it will be (Ertmer et al., 2012; Toru et al., 2006). Additionally, Zheng et al. (2016) reported a gap in research concerning 1:1 technology use in classrooms, noting that little investigation has been conducted to explore the experiences of teachers during such an initiative.

This study's professional value was its provision of insights concerning 1:1 technology adoption into classroom pedagogies. The study revealed specific teacher perceptions that impact

their adoption of the 1:1 technology into classroom practices, indicating a need for action to improve perceptions of non-adopters. Taking action to improve teachers' perceptions of 1:1 technology's usefulness or ease of use in class activities could positively impact the adoption of the technology into curriculum and instructional design (Christensen et al., 2011; Holden, Ant, & Roy, 2008; Inan & Lowther, 2010a). Hubbard (2014) indicated that decision-makers "usually have imperfect information (i.e., uncertainty) about the best choice for a decision, [and] decisions should be modeled quantitatively" (p. 7). This study's collection and analysis of quantitative data aids in the reduction of uncertainty (Hubbard, 2014), providing a basis for future decision making.

The study's potential identification of adopter groups with shared characteristics or perspectives may inform decision makers about needs for teacher education, technology and curriculum integration, or other factors leading to increased adoption of the initiative. Incorporating technology into classrooms may be challenging for some teachers, causing them to dismiss consideration of adoption due to perceptions of complexity (Rogers, 2003). Prior research indicates that perceived usefulness is a critical factor in user acceptance of technology (Sun & Zhang, 2006). The majority of instructors have not experienced 1:1 technology use as students, resulting in less awareness of the tool's benefits in classroom activities and therefore lower perceptions of its usefulness (Akman & Turhan, 2015). Most teachers experienced life before technology and are regarded as digital immigrants, people who have actively worked to assimilate technology into cultural and societal practices (Adams & Pente, 2011; Gu et al., 2013). The lives of digital immigrants were partly defined by life events and attitudes shaped by the introduction of computers (Adams & Pente, 2011; Gu et al., 2013). Therefore, they may dismiss consideration of adoption due to low expectations of 1:1 technology's relative

advantages and / or compatibility (Rogers, 2003). The current study's investigation of teacher demographics revealed relationships that may inform school administrators' decisions regarding encouraging digital immigrants' adoption of the tool.

Millennial students are digital natives, having been born into a world in which technology is an intrinsic aspect of daily life (Gu et al., 2013; Woempner, 2007). The conflicting worldviews between digital immigrant-teachers and digital native-students has resulted in greatly differing attitudes, expectations, practices, and learning styles (Ertmer et al., 2012; Howard et al., 2015; Howard & Gigliotti, 2016; Inan & Lowther, 2010b). These divergent digital backgrounds impact both communication and acceptance of technology into classwork (Adams & Pente, 2011). For instance, teachers may need software training, professional development, or mentoring to encourage their integration of technology into class activities, whereas their students are willing to utilize technology because it is an accepted part of daily life (Russell, Bebell, & Higgins, 2004; Sahin et al., 2016; Sana, Weston, & Cepeda, 2013; Toru et al., 2006; Windschitl & Sahl, 2002). It is hoped that the results of this research study will make a worthwhile contribution to the existing body of knowledge by drawing attention to teachers' perceptions of 1:1 technology use with the digital natives they teach. The identification of factorial relationships may provide a greater depth of knowledge that will positively impact 1:1 technology integration into students' classroom learning experiences.

Theoretical/Conceptual Framework

The objective of this quantitative research study was to investigate current, real-life experiences that were in progress (Creswell, 2013). Hubbard (2014) emphasized the need for measurement in decision-making and evaluation of the effectiveness of programs and initiatives.

Examining the reported perspectives of teachers during the adoption of 1:1 technology in classroom activities provided information about the realities of the program for the teachers experiencing it. Primary sources of information are fundamental to informing understanding of the experiences and perspectives of those directly involved with an event, program, or culture (Levine-Clark & Carter, 2013). Collecting data from teachers concerning their experiences allowed 1:1 technology integration to be viewed through the unique lenses of its participants.

The transition from traditional pedagogies into 1:1 technology-based classroom activities was investigated as a relatively untapped area of exploration (Zheng et al., 2016). The study assumed that the experiences of teaching in a technology-rich environment will inherently have new benefits as well as challenges (Inan & Lowther, 2010b; Sahin et al., 2016). Teachers' willingness to undertake the processes required to change classroom practices to include 1:1 technology is impacted by their perceptions of the ease of use and the usefulness of the tool (Davis, 1989; Marangunic & Granic, 2015). The data were analyzed through inferential statistics to determine if significant relationships exist among teachers' stated levels of adoption with specific variables.

The dissertation research centered around a conceptual framework based on constructivist learning theory and its relationship to the transformational leadership needed from teachers in their instruction of 21st century learners (Sorenson, Goldsmith, Méndez, & Maxwell, 2011). Millennial students prefer activities that allow them to collaborate, investigate, and create: radical departures from traditional classroom practices focused on information presentation (Christensen et al., 2011; Sorenson et al., 2011). Instruction that is student-centric, with teachers acting as facilitators instead of lecturers, is required to effectively address the needs of millennial learners (Barnes, Marateo, & Ferris, 2007; Wilson & Gerber, 2008). A combination of social

constructivist and cognitive constructivist activities (Felix, 2005) allows participants to benefit from observational learning (Martin, 2004; Mbati, 2013). Constructivist processes that employ social cognitive practices like modeling and observation may encourage greater teacher adoption of desired 1:1 technology-based activities and learning platforms (Anderson & Dron, 2011; Bandura, 1977).

Given the expectation that ubiquitous technology use in classroom activities will increase student engagement and interest in class work (Roehl et al., 2013; Tinker et al., 2007), constructivism may be viewed as foundational to the employed pedagogies and therefore grounds the research. Millennial students prefer student-centered, performance-focused learning that involves learner-constructed knowledge arising from multiple information sources and experiences as well as digital literacies (Mbati, 2013; Sorenson et al., 2011; Wilson & Gerber, 2008). Student-centric activities allow 21st century learners to acquire knowledge through investigation, reading, research, and collaboration (Barnes et al., 2007; Beyers, 2009; Christensen et al., 2011; Sorenson et al., 2011; Woempner, 2007). Ertmer et al. (2012) noted that teachers with constructivist beliefs more readily employ technology in designing student-centered curricula.

Developing pedagogies that allow students to use technology to communicate, collaborate, and solve problems requires teachers to be transformational leaders who "see the benefits of change" (Sorenson et al., 2011, p. 71). It is important for instructors to make the transition from the traditional teacher-directed, memory-focused learning tasks that were inherent aspects of previous decades' public school practices (Geer, White, Zeegers, Au, & Barnes, 2017). The outdated approach, based on knowledge from limited authoritative sources and textbooks, fails to adequately address the needs of millennial learners (Christensen et al.,

2011; Roehl et al., 2013; Zyngier, 2008). The change in teacher leadership from presenter to facilitator, allowing students the freedom to construct knowledge and develop their own understandings of subject matter, can be accomplished through well-planned utilization of available personal computing devices (Felix, 2005; Overbay, Patterson, Vasu, & Grable, 2010; Powell & Kalina, 2009).

Constructivism provides the foundation for transformational classroom leadership practices that support both curriculum and student-centered learning pedagogies (Leithwood & Jantzi, 2000; Mbati, 2013) through the incorporation of 1:1 technology use into classroom activities (Keengwe & Onchwari, 2008; Overbay et al., 2010). Additionally, constructivist-oriented teachers use technology more frequently and in more varied, powerful activities (Barrow et al., 2009; Overbay et al., 2010). Teachers who focus instructional practices on activities and tools that engage millennial students are transformational leaders who can positively impact the development of more effective educational practices (Christensen & Eyring, 2011; Christensen et al., 2011). Figure 1.1 provides a graphic representation of the theoretical/conceptual framework that undergirds this prospectus.

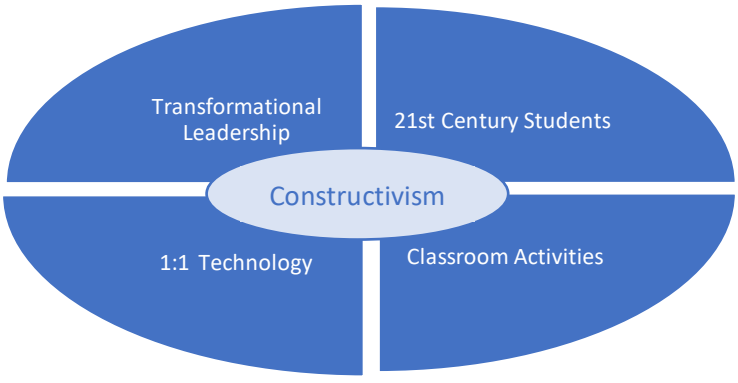

Figure 1.1 Theoretical/Conceptual Framework

Definition of Terms

1:1 Technology – The central concept of 1:1 technology is defined as a learning environment in which each student has a personal computing device such as a laptop, Chromebook, iPad, or tablet for use during class (Tallvid, 2016; Tallvid, Lundin, Lindstrom, & Svensson, 2015).

Digital Immigrants – Those people who experienced the era during which technology was introduced and adopted (Greenhow et al., 2010; Gu et al., 2013).

Digital Natives – Those people born into a culture in which technology use is ubiquitous (Adams & Pente, 2011; Gu et al., 2013).

Millennials – Those people born between 1980 and the mid-2000s (Greenhow et al., 2010).

Organizational Factors – Variables related to support of the 1:1 technology program by the faculty, administration, technology team, students' caregivers, and community stakeholders (Lowther et al., 2012; Teo, 2010a).

Pedagogy – For the purposes of this study, pedagogy is defined as the methods and practices involved with teaching (Daniels, 2016)

Perceived Ease of Use – The extent to which teachers feel that 1:1 technology use in class activities will be free of effort (Davis, 1989; Marangunic & Granic, 2015; McFarland & Hamilton, 2006).

Perceived Usefulness – The extent to which teachers feel that 1:1 technology will enhance their work performance (Davis, 1989; Marangunic & Granic, 2015; McFarland & Hamilton, 2006).

Stage of Adoption – For the purpose of this study, teachers' stated level of use of 1:1 technology in classroom pedagogies, as defined by Christensen (1997).

Technology Acceptance Model (TAM) – A construct determining users' acceptance of technology based on perceptions of its usefulness and ease of use (Davis, 1989; Marangunic & Granic, 2015).

Methodological Assumptions

Specific to the methodology of this quantitative research study was the assumption that respondents truthfully supplied answers and/or statements during data collection. The assumption existed that the survey instrument measured what was intended. Further assumptions included teachers' understandings of and experiences with the 1:1 technology. Finally, the assumption existed that teachers correctly assessed their level of adoption of 1:1 technology into classroom pedagogies.

Delimitations

Delimitations, "the boundaries of the study [that possibly impact] ways in which the findings may lack generalizability" (Joyner, Rouse, & Glatthorn, 2013, p. 209) included the time period, setting, and size of the sample. The survey deployment took place at the beginning of a school year, thereby possibly eliciting more optimistic responses than would be provided by teachers experiencing fatigue at the middle or end of a term. The study was delimited to teachers in specific rural high schools in the southeastern United States. The study was further delimited to public schools that have made 1:1 technology available for integration into classroom activities. Its sample size was a delimiter, in that the census-style survey was subject to variable response rates within school systems, depending on the extent of principals' encouragement of faculty to participate as well as teachers' availability of time to do so.

Limitations

Based on warnings from Kahneman (2011) that researchers who select "too small a sample leave themselves at the mercy of sampling luck" (p. 112), this study's design incorporated an attempt to deploy the survey instrument to more than 650 teachers in 9 different school systems. However, not all principals proved willing when requested to share the survey link. This and other factors resulted in the online survey falling subject to a lower than hoped response rate. A total of 211 participants provided responses; however not all respondents submitted fully completed surveys, resulting in additional limitations within the data.

Limitations also stemmed from the nature of self-reporting. Stake (2010) noted that "bias is ubiquitous" (p. 164) and can impact data in numerous ways. It is possible that most of the teachers who responded to the survey may have been proponents of 1:1 technology use, making the research design's data collection through a census-style survey subject to sample bias, the over- or underrepresentation of members of the population (Plous, 1993; Speirs-Bridge, Fidler, McBride, Flander, Cumming, & Burgman, 2010). Potential respondents with unfavorable views of 1:1 technology may have declined the invitation to participate in the survey research. This may have caused that group to be underrepresented, causing sample bias, or not represented at all, resulting in nonresponse bias (Porter, 2011). Additionally, the wording of the survey questions may have created response bias by affecting respondents' answers in such a way that their true perspectives were not reported (Hubbard, 2014). Teachers' limited knowledge about the survey's subject matter may also have affected the study's findings, and the possibility exists that teachers may have thought they understand a premise or question completely but did not, in what Kahneman (2011) labeled "the illusion of understanding" (p. 199).

Limitations were also inherent in participants' self-reporting and potentially biased responses. The study was limited by respondents' willingness to be honest and forthcoming in their answers and comments. The results of this study showed that its respondents were primarily teachers who were comfortable with 1:1 technology and had adopted it into classroom pedagogies, resulting in bias. Additionally, a recency effect occurs when people base responses on the most recent episode in their recollections of an issue or event (Plous, 1993). Kahneman (2011) indicated that "the experience of a moment of an episode" (p. 393) can impact one's recollections and connotations of associated factors. Teachers' reports concerning 1:1 technology use in class activities could have been biased by recent positive or negative experiences.

Teacher respondents may also have been subject to self-biasing effects (Kahneman, 2011), desiring to share only positive experiences in anticipation of impressing the researcher with their successes. Bias in favor of technology integration may also have been a limitation of the study. Enthusiastic supporters of technology in general or of their school system's 1:1 technology program may have been more inclined to represent their experiences positively than those who were later adopters (Rogers, 2003) or skeptics. The emphasis of technology in the school or school system where teachers work may also cause bias, with 1:1 technology integration perceived more favorably by members of organizations where technology use is more valued and more widely utilized. The effects of social desirability may also have had an impact on participants' responses (Plous, 1993), causing them to provide answers that they suspected the researcher would prefer. The possibility that teachers experienced interruptions during survey completion may also have impacted participants' responses.

Finally, the researcher acknowledges that the study's findings were conditional and that any knowledge gleaned from the study is approximate and representative of the experiences of a

small group during a set time frame. The external validity of the study was limited, constrained to high school teachers in small, rural, southeastern towns, affecting "the extent to which the findings will generalize to other populations and settings" (Gliner, Morgan, & Leech, 2009, p. 102).

Summary of the Chapter

This dissertation study involved nonexperimental research to investigate the adoption of 1:1 technology by high school teachers in rural areas of the southeastern United States. The rate of adoption and potential relationships with various organizational and teacher characteristics, as well as by teachers' perceptions of the tool's usefulness and ease of use, were investigated via an online survey. The ubiquitous involvement of technology in the lives of millennial students has resulted in its incorporation into government-mandated learning objectives. Educational decision makers opted to invest in ways to provide 1:1 technology access to students, but not all teachers have taken advantage of the opportunity. The results of the exploration of potential relationships impacting teachers' adoption rates may inform future efforts to increase integration of the tools into classroom pedagogies and curriculum.

CHAPTER II

REVIEW OF THE LITERATURE

Surveys and Socially Desirable Responses

Trochim (2006) noted that "people come to the research endeavor with their own sets of biases and prejudices" (Measurement, Survey Research, Biases, para. 1). The term social desirability refers to the wish to be seen from a culturally acceptable or commendable perspective (Chung & Monroe, 2003). In research, the tendency for people to respond to questionnaires in ways that make them appear in a positive light is referred to as socially desirable responding (SDR), according to van de Mortel (2008). SDR can cause data collected via participants' self-responses to be impacted by bias (Park, Peacey, & Munafò, 2014). "The prevalence of bias in human judgment is a large issue" (Kahneman, 2011, p. 165), and the problem created by reporting bias can have a strong impact on data collected through online self-report mechanisms (Dellarocas & Wood, 2009). When people respond quickly and automatically to questions without investing much thought or deliberation into their answers, they are utilizing only System 1 mental processes (Kahneman, 2011). System 1 is subjective and effortless, impulsive and ego-driven (Kahneman, 2011). Such automatic, System 1 responses may lead to SDR, which can confound research results by obscuring relationships between variables or by creating untrue relationships (van de Mortel, 2008). When research is conducted via participants' self-assessments, the researcher must be cognizant of the possibility of SDR and recognize the possibility of its occurrence as a limitation of the research study.

Adoption of Innovation

The Diffusion of Innovation Theory (Rogers, 2003) indicates that when an innovation is made available, people will respond to it with varying levels of enthusiasm. Interest and commitment range from full implementation to complete rejection (Foulger et al., 2013). Rogers (2003) determined that people may be classified by the timing of their response to innovation into adopter categories: innovators, early adopters, early majority, late majority, and laggards. The group identified as innovators will readily explore the new idea, product, or practice, and the early adopters will make a judicious decision to follow suit soon thereafter (Rogers, 2003). The early majority and eventually the late majority, through the symbolic modeling and observational learning identified by Bandura (2006) as key cognitive components of social diffusion, will begin adoption processes next. The laggards, having resisted due to a focus on the innovation's relative disadvantages, incompatibility with their values, or complexity, will be at the end of the acceptance cycle (Ribak & Rosenthal, 2015).

Rogers (2003) posited that there are five stages involved in the innovation decision-making process, beginning with knowledge of the thing. Awareness transitions to "forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 2003, p. 170). Attitudes toward the innovation arise from perceptions of its relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). Relative advantage, "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 15), impacts the speed at which an innovation's adoption rate occurs. Compatibility with potential adopters' existing values, past experiences, and needs also affects the readiness with which an innovation is adopted; in some cases, those asked to accept an innovation must first change an existing value

set or reconcile themselves to the aspects of the innovation that are initially incompatible with their prior experiences (Rogers, 2003). Perceptions of an innovation's complexity and trialability also influence adoption rates, as people are more inclined to embrace things that are easy and that can be tried out on a limited basis (Rogers, 2003). Bandura (2006) noted that observability is achieved through symbolic modeling and observational learning, and Rogers (2003) indicated that the visible results of an innovation's effectiveness are a key factor in the rate of adoption. An individual teacher's decision to participate in the opportunity to adopt 1:1 technology into curriculum will be affected by these factors, resulting in that teacher joining the ranks of one of the classifications of adopter types or rejecting the innovation altogether.

Technology Acceptance Model

The Technology Acceptance Model (TAM) was developed using the psychology-based theory of reasoned action (TRA) and theory of planned behavior (TPB) as its inspiration (Davis, 1989; Marangunic & Granic, 2015). It is a frequently used model, having been employed in a respectable amount of work since its inception more than a quarter century ago (Marangunic & Granic, 2015). The TAM identifies the technology user's intention as the most immediate predictor of usage behavior (Marangunic & Granic, 2015; Teo, 2010a). The TAM has been proven to be an effective model across a wide span of disciplines and as a predictor for a broad array of technological innovations. "Both correlation analysis and [standard error of the mean] (SEM) showed the significance of perceived usefulness and perceived ease of use towards attitude and behavioral intention to use," according to Schepers and Wetzels (2007a, p. 99). The TAM has been widely employed in educational settings because of its ability to generate

quantifiable variables that can be used to understand predispositions toward technology acceptance (Straub, 2009).

According to Chintalapati and Daruri (2016), the TAM's popularity is due to its fulfillment of three essential elements of a theoretical model: parsimony, verifiability, and generalizability. It exhibits simplicity (parsimony), is supported by data (verifiability), and is applicable to research that investigates the acceptance and usage of new technologies (generalizability), having been utilized in numerous studies across a wide variety of fields (Chintalapati & Daruri, 2016). Its popularity in the research field of technology acceptance is due to its broad applicability to various topics as well as its ability to succinctly define the constructs that precede acceptance (Lee, Lee, & Boyle, 2012). According to Marangunic and Granic (2015), "TAM has evolved to become the key model in understanding the predictors of human behavior toward potential acceptance or rejection of . . . technology" (p. 92). Its ability to address technology in various forms and across a wide range of fields makes it a highly useful research tool.

The TAM identifies the determinants that affect behavioral intention, Perceived Ease of Use (PEoU) and Perceived Usefulness (PU), to investigate why technology users accept or reject a given technological innovation (Davis, 1989; Edmunds, Thorpe, & Conole, 2012; Elwood, Changchit, & Cutshall, 2006; Gu et al., 2013; Legris, Ingham, & Collerette, 2003; Persico, Manca, & Pozzi, 2014; Teo, 2010b). Perceived Ease of Use (PEoU) refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Perceived Usefulness (PU) refers to the extent to which a person believes that using a given type of technology would enhance job performance (Davis, 1989; Evans, Hackney, Rauniar, Rawski, Yang, & Johnson, 2014). In an examination of whether teachers elect to utilize

1:1 technology as part of their students' classroom learning activities, understanding their perceptions of the learning devices' usefulness and ease of use is a key element. Additionally, based on its proven effectiveness (Schepers & Wetzels, 2007a; Sun & Zhang, 2006), the TAM was utilized as a primary tool in the development of this research study.

Constructivism

Bandura (1977) formulated social cognitive learning theory, stating that "most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action" (p 22). Attention, retention, initiation, and motivation are requisite for learning to take place (Bandura, 1977). Constructivism focuses on learning processes involving the individual's incorporation and assimilation of knowledge based on the creation of understandings through experiences and reflections over the connections to existing beliefs (Overbay et al., 2010). Using tenets of social learning theory in an integration of Piagetian and Vygotskian perspectives results in a balanced constructivist platform on which effective learning opportunities can be built (as cited in Fuson, 2009). Constructivist practices allow students to learn through the social activities of observation and emulation as they undertake construction of knowledge through reflection and experiences (Powell & Kalina, 2009). An interactive, facilitating environment results in learners who collaborate, investigate, and formulate new understandings through interest and engagement in classroom activities (Christensen et al., 2011; Christensen, 1997; Edmunds et al., 2012; Greenhow et al., 2010; Hew & Brush, 2007).

Millennial students learn differently than their predecessors (Barnes et al., 2007), requiring shifts in pedagogy and instructional design to feature challenging, hands-on, authentic

learning activities that promote student interest (Donovan, Green, & Hartley, 2010; Rothwell & Kazanas, 2008; Wang & Degol, 2014). It is a primary role of the teacher to locate or create and implement interesting activities that will capture and maintain the attention and imagination of millennial learners (Goldberg, 2003; Harris, 2008; Zepke & Leach, 2010). As the technological age advances, the incorporation of technology into class activities has become increasingly emphasized (Lowther et al., 2003; Quinn, 2002; Zheng et al., 2016). Boredom is a key contributor to student disinterest and lack of participation in classroom activities (Yazzie-Mintz, 2007), making the identification of instructional methodology that will entice students to participate in class activities a primary focus of research efforts (Reschly & Christenson, 2012).

"Today's youth are the digital generation" (Donovan et al., 2010, p. 424), a group who has grown up with ubiquitous technology. Cognitive learning theorists "situate today's learners as natives in the digital landscape" (Pandina Scot, Callahan, & Urquhart, 2008, p. 41) and stress that they should be taught via methodology that is relevant to their 21st century world (Beyers, 2009; Wilson & Gerber, 2008; Woempner, 2007). The use of technology for educational purposes is linked to effective educational practices in classes for preschoolers through graduate school students (Cole, 2009; Donovan et al., 2010; Keengwe et al., 2008a; Laird & Kuh, 2005; Silvernail & Buffington, 2009; Windschitl & Sahl, 2002). Instructional activities are increasingly being impacted by the incorporation of technology (Littlejohn, Beetham, & McGill, 2012), and the experiences of participants are affected by the tools through which learning takes place (Mariotti, 2009; Moll, 2014). Utilizing technology to create learning opportunities based on constructivism allows the current generation of students to experience education appropriately designed to best address their needs (Barrett, Davies, Zhang, & Barrett, 2015; Christensen et al., 2011; Sorenson et al., 2011).

Technology as a Learning Platform

Hora and Holden (2013) reported that the integration of technology into curriculum design and instructional practices is critical to improving interaction between students and course content. Utilization of technology in various aspects of learning design, such as computer-assisted instruction, application software, and product generation has been found to increase student interest in classroom activities (Kidd & Keengwe, 2010). Bauer and Kenton (2005) noted the effectiveness of computers in providing means for students to store, manipulate, and retrieve information, which are activities that involve them in their learning. Furthermore, Christensen et al. (2011) advocated the development and adoption of technologically-based curricula that will stimulate students' "intellectual curiosity" (p. 149). Researchers have recognized an increasing need for new technologies to be adopted and utilized as an integral aspect of daily classroom activities (Beyers, 2009; Johnson et al., 2009). According to Lemke (2010), educators bear a responsibility for preparing students to live in a global, high-tech society by incorporating technology into instructional practices.

Classrooms now need pedagogies that address the unique requirements of millennial students (Christensen et al., 2011; Hop & Delver, 2011; Sorenson et al., 2011). Creating learning opportunities based on the needs of the students is a critical first step in effective instructional design (Rothwell & Kazanas, 2008; Sorenson et al., 2011). Curriculum changes need to incorporate practices that are student-centered, a radical departure from the traditional, teacher-centered methodologies that most teachers experienced in their own educations (Littlejohn et al., 2012; Woempner, 2007). Curriculum needs to be high-level, integrated, and relevant to millennial learners, with an active, research-driven focus that incorporates technology literacies

such as presentation creation and digital portfolio development (Chambers, 2014; Hancock, Knezek, & Christensen, 2007; Johnson et al., 2009; Sorenson et al., 2011).

The advent of the technology age demands that traditional educational approaches change with the times to accommodate the evolving demands of millennial students (Christensen & Eyring, 2011). The 2014 National Association of Independent Schools Report on the High School Survey of Student Engagement (Torres, 2015) noted that 79% of student respondents indicated that the type of classroom assignments and activities that most interest them are those involving technology. Teachers in classrooms with 1:1 technology provisions tend to create a more student-centered learning environment, utilizing pedagogies that focus on students' investigation, collaboration, and construction of knowledge (Barnes et al., 2007; Beyers, 2009; Mouza, 2008; Wilson & Gerber, 2008). Such student-centric instructional design is expected to result in increased student engagement and improved educational experiences for teachers and students alike (Johnson et al., 2009; Lowther et al., 2003; Mouza, 2008).

Instructional design implementing technology for class work involving student research, writing, collaboration, and presentations resulted in greater student participation in class work (Lowther et al., 2012). Teachers' utilization of technology as a partner in the teaching process is increasingly touted as the answer to involving students in the educational process (Bebell & O'Dwyer, 2010; Mouza, 2008). The development of a technology-based learning environment and the provision of information-rich tasks are becoming the primary objective of instructional design and daily classroom protocol (Levin & Wadmany, 2006). Adding technology into teaching methodologies interests 21st century learners more than traditional classroom activities (Christensen et al., 2011; Dunleavy & Heinecke, 2007; Grimes & Warschauer, 2008). Research identified student appreciation of quick feedback available through online class assessments

(Alcoholado et al., 2016) and marginal academic gains attributed to 1:1 technology (Weston & Bain, 2010; Zheng et al., 2016). However, teacher perspectives about 1:1 technology incorporation into class activities have been infrequently reported (Ertmer et al., 2012). Vygotsky theorized that the tools utilized in education shape the experiences of the participants (as cited in Mariotti, 2009), therefore making the medium through which learning takes place a key consideration.

1:1 Technology Initiatives

Over the past few decades, the integration of technology into classrooms has evolved through several iterations and continues to change (Keengwe et al., 2008b). Decision-makers have implemented several methods for providing students with access to computers that were tried and then soon abandoned (Chambers, 2014). Initial attempts involved a small number of desktop computers available in school libraries, before computer labs containing large numbers of machines were established to accommodate entire classes (Chambers, 2014). The next trend involved outfitting classrooms with a few personal computers (Chambers, 2014). As technology advanced, and smaller, more affordable computing tools were developed, the current trend has emerged: provision of a personal computing device for each student's use during class time (Alcoholado et al., 2016; Chambers, 2014; Lei & Zhao, 2008; Lowther et al., 2003; Mouza, 2008; Murphy, King, & Brown, 2007; Spanos & Sofos, 2015).

Studies comparing the effectiveness of technology integration into instructional methodology have found that classrooms in which all students had personal computer devices, as compared with learning environments in which technology is available for student use via computer labs or classroom desk-top computers, exhibited more frequent use of technology

(Holcomb, 2009; Russell et al., 2004). Grimes and Warschauer (2008) reported that students prefer having their own personal, dedicated device as opposed to "even the best array of shared-use computers" (p. 321). Dunleavy and Heinecke (2007) found that students in a 1:1 technology program exhibited greater increases in standardized test scores compared to students who did not have an individually-issued device. Russell et al. (2004) noted that a 1:1 technology provision program resulted in "more technology use across the curriculum, more use of technology at home for academic purposes, less large group instruction, and nearly universal use of technology for writing" (p. 313). The ubiquitous access to technology afforded by the distribution of 1:1 technology on a 1:1 basis has been identified as the most effective means of incorporating technology into student educational opportunities (Mouza, 2008). Serving as vehicles for learning and as cognitive tools, 1:1 technology enables learners to focus on subject matter while also empowering their learning opportunities (Weston & Bain, 2010).

Teacher Development of Pedagogical and Content Knowledge

Research suggests that both teachers' content knowledge and pedagogy are significantly correlated with student learning (Polly & Hannafin, 2010). Pedagogical content knowledge, technological pedagogical content knowledge, and content-specific knowledge for teaching all emphasize the need to simultaneously develop teachers' knowledge of content and content-specific pedagogies (Polly & Hannafin, 2010). Meta-analyses of large-scale professional development projects indicated that adoption of target practices increased when teachers actively learned specific content and related pedagogies (Polly & Hannafin, 2010).

The volitional nature of user acceptance is a key factor in the adoption of innovation (Chintalapati & Daruri, 2016). Teachers have the option of utilizing available instructional

methodologies in classroom activities, and their decisions are based on whether they are comfortable with a given channel of delivery, having acquired the knowledge and skills they need to use it (Chintalapati & Daruri, 2016). Teachers who experience 1:1 technology in the role of student, who discuss the curriculum integration via technology (Van Es & Sherin, 2008), and who learn how to explicitly connect content with classroom use of technology (Polly & Hannafin, 2010) are those most likely to adopt 1:1 technology as tools to facilitate their students' learning. Research suggests that when teachers complete technology-rich activities as learners, they more readily integrated technology use into their lesson plans (Penuel, Fishman, Yamaguchi, & Gallagher, 2007).

Zone of Proximal Development

The zone of proximal development (ZPD) is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. p. 78). The ZPD involves the difference between what one can do without assistance versus what needs help to do (Vygotsky, 1978)**.** Based on ZPD, then, teachers' willingness to embrace the opportunity to use 1:1 technology in classroom pedagogies will impacted by their own abilities and skill level with the tool.

One research study examined teachers' knowledge of using technology in pedagogies and led to insights about the impact of their ZPD (Johnston & Moyer-Packenham, 2012). Recognition of a relationship between teachers' experience base and their inability to effectively assimilate technology into pedagogies may indicate insufficient attention by change agents to the need for teachers to be in a ZPD before they will be willing to undertake adoption of the

innovation (Zuber & Anderson, 2013). Identification of the dimension in which teachers' knowledge resides may reveal a need for types of experiences that support teachers' acquisition of the knowledge required to teach using technology (Johnston & Moyer-Packenham, 2012). Teachers' opportunities to incorporate new ways of facilitating learning for their students are taken advantage of most often when support for the innovation is provided by an experienced mentor or trainer (Glazer & Hannafin, 2006). As teachers attempt to implement 1:1 technology-based activities with their students, they need support through workshops, intentional collaboration, mentors, and the like (Polly & Hannafin, 2010). Research identified teachers' increased proficiency at developing and integrating technology-based activities when they were paired as collaborative apprentices with teams of their peers who acted as mentors (Glazer & Hannafin, 2006). Novice teachers who receive guidance and support in their efforts to adopt new innovations to facilitate student learning are more likely to successfully change classroom activities and better incorporate curriculum content into the learning (Polly & Hannafin, 2010).

Additionally, teachers' ZPD (Vygotsky, 1978) may be impacted by the organizational culture, innovation setting, organizational goals, and actions of other teachers (Shabani, Khatib, & Ebadi, 2010; Zuber & Anderson, 2013). In organizations where teachers interact frequently about their use of technology in teaching, more teachers are likely to become willing to attempt adoption of the innovation after witnessing colleagues' successful practices (Bandura, 2006). Teachers who work in a school where the innovation is actively modeled may have ZPD expansion that encompasses knowledge of effective use of the technology (Johnston & Moyer-Packenham, 2012). This may lead them to eventually feel sufficiently confident in the innovation's benefits to risk undertaking needed changes for implementing it themselves (Polly & Ausband, 2009). Adoption is influenced by perceptions of an innovation's worth (Bandura,

2006; Rogers, 2003); therefore, teachers' exposure to technology use in teaching may be related to their development of willingness to invest in learning to effectively utilize the tool in their own teaching. Polly and Ausband (2009) noted that teachers will be more likely to utilize 1:1 technology-based tasks when they have had opportunities to experience them as students, either through classes in which they are enrolled or via model lessons presented by trainers. Additionally, millennial students may be more comfortable with technology than teachers, having grown up as digital natives thoroughly immersed in a technologically-infused world, whereas their instructors are digital immigrants who had to learn how to incorporate technology use into daily life (Adams & Pente, 2011). This discrepancy in familiarity may be offset in part by deliberate efforts to raise teachers' ZPD (Polly & Ausband, 2009)Teachers become increasingly motivated when their efforts build on prior knowledge, align with their personal interests and beliefs, and allow them to have ownership of their learning (Polly & Hannafin, 2010).

Summary of the Chapter

As indicated in the literature review, teachers in the schools that opt to provide learning opportunities via 1:1 technology are the key to the success of the initiative. The benefits of 1:1 technology for millennial learners may include increased student engagement in classroom activities, higher levels of collaboration, improved technological literacy, and increased achievement of standards and objectives. Incorporation of 1:1 technology use into classroom activities employs constructivist practices that have been determined beneficial to millennial learners. Some key elements of teachers' decision to adopt or reject the innovation are expressed through the tenets of the Technology Acceptance Model: Perceived Ease of Use and Perceived

Usefulness. Teachers' Zone of Proximal Development also impacts their choice to utilize available 1:1 technology. This research study's investigation of teachers' reported levels of 1:1 technology adoption in relation to various factors was limited due to potential biases liable to occur in the self-reporting of information via the research design's use of an electronic survey for data collection.

CHAPTER III

METHODOLOGY

The quantitative research study employed an online survey instrument for data collection. The research utilized descriptive statistics, Pearson correlation analysis, and linear regression analysis to investigate possible relationships between adoption rates and organizational and teacher characteristics. The research focused on high school teachers in the rural, southeastern United States.

Description of the Population

Population and Setting

A key step in research design is the identification of the research site and "individuals who are accessible, willing to provide information, and [who are able to] shed light on [the] specific phenomenon" (Creswell, 2013, p. 147). The ideal research study site is one where "entry is possible, [and] ethical and political considerations are not overwhelming, at least initially" (Rossman & Rallis, 2012, p. 137). To satisfy the above criteria, the population included teachers in specific rural, southeastern high schools in which 1:1 technology had been introduced as a tool and to which the researcher had obtained access. Nine high schools were identified with 1:1 technology programs at their high schools, and permission was granted by school administrators for the research to be conducted within their organizations. Documentation of approval from the school districts' superintendents and high school principals is included as Appendix A.

Sample

The accessible population was approximately 650 high school teachers employed at various rural, southeastern high schools. The sample size was dependent on the survey response rate (Gliner et al., 2009). Recruiting a sample that aligns with the study's purpose, its central questions, and the data being sought is vital to the quality of a research study (Patton, 2015). The sites provided an accessible population (Gliner et al., 2009) that allowed the researcher to collect data from individuals willing to "purposefully inform an understanding of the research problem" (Creswell, 2013, p. 156). The census-style survey tool was digitally deployed during the first weeks of a new school year. It was sent via an online link to high school principals for deployment to faculty members. The survey included a question through which teachers who were new members of the organization self-eliminated. This was to ensure that participants had spent sufficient time in the organization's 1:1 technology environment to adequately assess the experience (Sluss & Thompson, 2012). While 211 teachers responded to the survey, 53 provided incomplete information and their data were culled, resulting in a final sample size of 158 teachers.

Research Design

Dependent, Independent, and Extraneous Variables

The study involved the use and adaptation of existing measurement instruments that employed questions and Likert-style responses for data collection. The dependent variable, teachers' reported stage of adoption of 1:1 technology in classroom activities, provided the basis for the research. The existing instruments consisted of Likert-style scale responses, most of which offered five response options, the minimum number recommended by Allen and Seaman

(2007). Measurement of the variables via the Likert-style scale responses allowed the researcher to explore the abstract concepts of teachers' perceptions through unidimensional response options (Trochim & Donnelly, 2008).

Research question 1 was examined to determine if there is a relationship between the dependent variable, teachers' reported levels of adoption of 1:1 technology for classroom activities, and teachers' perception of the usefulness of 1:1 technology for class activities. Perceived usefulness is defined as the extent to which instructors believe that 1:1 technology will enhance their work performance (McFarland & Hamilton, 2006). Data pertaining to research question 2 was investigated to determine if there is a significant relationship between the dependent variable, teachers' reported level of adoption of 1:1 technology, and their perception of ease of students' 1:1 technology use for class activities. Research question 3 explored whether significant relationships exist between the dependent variable, teachers' reported level of adoption of 1:1 technology for classroom activities, and the independent variable of support from caregivers, the community, school administrators, colleagues, and the school's technical support program. Data related to research question 4 was examined to determine if relationships exist between the dependent variable of teachers' reported levels of technology adoption and extraneous factors concerning teacher characteristics, including teachers' cumulative years of teaching experience, highest level of education attainment, gender identity, and age group.

Instrumentation

The nonexperimental research collected quantitative data for comparative and associational analysis with an online survey instrument sent to teachers. Due to the relative newness of 1:1 technology integration in class activities, no existing measurement instrument

was available that specifically addressed the research questions in relation to the TAM. Two published survey tools were located that have been combined and slightly modified to create a measurement tool that will collect data needed to investigate the research hypotheses. The Stages of Adoption of Technology (SA) Survey (Christensen, 1997) and the Freedom to Learn-Teacher Technology Questionnaire (FLT-TTQ), presented by Lowther, Ross, and Alberg (2000), were combined. The researcher adjusted questions' wording to directly address 1:1 technology integration into classroom activities. Permission was obtained from the owners of both instruments. Appendix B contains texts of the original instruments, documentation of permission to use the SA, and a Usage Agreement Statement that was completed prior to use of the FLT-TTQ.

Some of the instruments' questions were adapted or added to specifically address teacher and organizational characteristics and TAM-based perceptions. Due to these changes, the survey instrument was peer reviewed prior to its use to establish content validity (Patten, 2012; Trochim & Donnelly, 2008). Feedback was elicited to develop and refine both the adapted and the original questions. The peer review was conducted via the assistance of educators beyond the parameters of the study's population, to avoid risk of contamination of the research sample (Gliner et al., 2009).

The SA is a single item survey that has a test-retest reliability estimate of $r = .91$ (Hancock et al., 2007). The SA generalizes its descriptions of each stage of adoption of technology to make the statements appropriate for any information technology (Christensen, 1997). The researcher slightly revised the original instrument's text to specifically investigate teachers' self-reported stage of 1:1 technology integration into classroom activities. A six-level Likert-style scale includes detailed explanations of each level of adoption, adapted from but kept

as close as possible to the original instrument's wording so as not to damage the instrument's reliability (Davis, 1989; Marangunic & Granic, 2015).

Additional sections of the questionnaire were based on the FLT-TTQ, which was designed as a two-part instrument (Lowther et al., 2000). The FLT-TTQ was initially validated as the Teacher Technology Questionnaire (TTQ) and has been frequently used in research studies (Lowther et al., 2008). The FLT-TTQ is the copyrighted property of the Center for Research in Educational Policy (CREP). The researcher obtained permission from the institution to utilize and adapt the instrument. The CREP provided an instrument usage agreement statement that was completed and returned prior to the instrument's utilization. This agreement is included in Appendix B.

The reliability of the FLT-TTQ was established during research conducted by the Center for Research in Educational Policy, with reliability coefficients determined, ranging from .75 to .89 for each subscale of the instrument (Inan & Lowther, 2010a). The adaptation of the FLT-TTQ from the original TTQ was completed to reflect changes in statements' wording to shift inquiry from technology in general to instead address a specific grant-supplied laptop initiative (Inan & Lowther, 2010a). For the purposes of this research study, the FLT-TTQ was adjusted in two ways: first, to address all types of 1:1 technology, whether laptop- or tablet-based; and second, to utilize only those sections applicable to the majority of schools, in effect eliminating the final section's questions about lead teachers/super coaches (Inan & Lowther, 2010a), which were not applicable to all school systems' technology programs. The revision of the retained sections asked teachers to respond with their level of agreement to statements regarding five technology-related areas: impact on classroom instruction, impact on students, teacher readiness to integrate technology, overall support for technology in the school, and technical support (Inan

& Lowther, 2010b). Participants' responses were based on a five-point Likert-type scale that ranged from (1) strongly disagree to (5) strongly agree (Inan & Lowther, 2010b).

The final section of the research instrument collected data concerning teachers' demographic information and qualifications, such as age and years of teaching experience, and teachers' rating of their perceptions of the usefulness and ease of use of 1:1 technology in classroom activities, based on the TAM (Davis, 1989; Marangunic & Granic, 2015). Appendix C includes the wording of the questions and response option used in the survey instrument. The questionnaire was presented to the University of Tennessee at Chattanooga Institutional Review Board (IRB) for approval prior to its deployment and received approval, IRB #17-111.

Data Analysis Techniques

Procedures

The procedures of this study involved conducting descriptive research, Pearson correlations analysis, and regression analysis to investigate quantitative data collected through a digitally deployed survey. The research focused on the analysis of data gathered through Likert-style survey questions. The majority of the questions had five response categories, as recommended by Allen and Seaman (2007) as the optimal number of options. According to Anseel, Lievens, Schollaert, and Choragwicka (2010), survey response rates are higher when prenotification of survey deployment is carried out. Since notifying participants in advance that they will receive a survey appears to improve response rates by introducing the researcher and establishing rapport (Brinkmann & Kvale, 2015), each participating school's principal was asked to notify faculty members in advance of sharing the survey link.

Data Collection

The survey instrument was created using Qualtrics (2017) software. The instrument was digitally deployed to the schools' faculty members via a link shared by the schools' principals. The initial paragraph of the survey contained informed consent information and provided teachers the opportunity to opt out of participation after reading the introduction.

Respondents were assured that neither their names nor other identifying information would be included in this research report, and every effort was made to maintain confidentiality (Rossman & Rallis, 2012; Trochim, 2006). To protect confidentiality, participants, institutions, and school districts are not named in this research report (Rossman & Rallis, 2012). Research records were not anonymous, due to the Qualtrics (2017) software collection of IEP addresses as respondents submitted their data; however, every effort was made to ensure confidentiality to the extent of the law. All data was depersonalized to protect the identities of respondents. Teacher records were identifiable and, as such, were assigned code numbers. The list connecting names to codes was kept in a digital, password-locked file in a password-protected computer, and the list was destroyed upon the study's completion.

Prior to deployment, a peer review of the survey instrument was conducted via educators who were not potential survey participants, and also through the assistance of the researcher's cohort members and UTC staff (Creswell, 2013). This helped establish the face validity of the research tool (Trochim, 2006). The research instrument was preceded by introductory information explaining the procedures, risks, and benefits of the research (Trochim, 2006). The introduction affirmed that respondents' participation was voluntary and served as informed consent: recipients of the deployed tool were asked to indicate their agreement to participate in

the study prior to receiving access to the survey. The exact wording of informed consent is included in Appendix C as question 1 of the survey text.

Data collected throughout the research study was kept secure, with all digital files stored on a password-protected computer maintained solely in the researcher's possession (Rossman & Rallis, 2012). Only the researcher and dissertation committee had access to the raw data. Backup copies of the data were maintained throughout the duration of the project in two separate, secure locations (Patton, 2015). All digital files were destroyed upon completion of the research project (Rossman & Rallis, 2012). The time frame for data collection was 17 days, although research indicated that response return rates peak within the first 3 days after deployment (Dillman & Bowker, 2001; Groves, Fowler Jr, Couper, Lepkowski, Singer, & Tourangeau, 2011). The additional days were the result of delays in principals' forwarding of the survey link to faculty members. This caused the survey deployment to be staggered among participating schools, and the additional time provided opportunity for as many responses as possible within a reasonable time frame. Principals were contacted by telephone to confirm receipt and sharing of the survey link. Reminder emails were sent to participating schools' principals to send to faculty members to encourage more teachers to respond (Rossman & Rallis, 2012). The survey window was closed based on data provided via Qualtrics (2017) software; the program indicated when a reasonable span of time had passed during which surveys were no longer being returned, and after consultation with the dissertation chair, the researcher closed the survey window.

Data Analysis

Gliner et al. (2009) indicated that the purpose of research is the "discovery of new knowledge" (p. 4). One direction that a research study can pursue is to investigate the efficacy of

a practice or product (Gliner et al., 2009). A research study's purpose is the driving force behind data analysis, and its design frames the analysis (Patton, 2015). Research requires taking things apart, analyzing them, putting the parts back together, then synthesizing new understandings (Stake, 2010). The research in this study took apart reported perceptions and behaviors concerning the adoption and implementation of 1:1 technology in class activities. The survey tool's collection of self-reported data impacted the integrity of the data (Kahneman, 2011) and is a recognized limitation of the study. The analysis of data collected for this quantitative research study was an appropriate means for answering its research questions because the processes were conducted in a way that will allow its results to be possibly combined with future studies (Gliner et al., 2009). This might result in the creation of a larger body of evidence that could later be utilized in answering questions that might not be answered in a single study (Gliner et al., 2009).

Computer software was employed in all data analysis processes for calculation of the quantitative data collected for this study (Field, 2013). Regression analysis, Pearson correlation analysis, and descriptive statistics procedures were conducted on the quantitative data collected from the surveys. The Qualtrics (2017) software used to create the survey instrument features an option to export the collected data directly into the data analysis software. The data were analyzed for descriptive statistical information using International Business Machines Statistical Package for the Social Sciences (IBM SPSS) software (IBM, 2016) to determine frequencies and means. The independent variables measured by Likert-style survey questions incorporated categories based on an interval scale (Field, 2013; Gliner et al., 2009; Salkind, 2010). A Pearson correlation was performed to determine the strength of the continuous independent variables' relationships (Field, 2013; Gliner et al., 2009; Salkind, 2010). Multivariate linear regression

analyses were conducted on the dependent variable, SA, and the independent variables associated with each of the four research questions.

Summary of the Chapter

Chapter III provided an overview of the methodology used for this research. The purpose of this research study was to determine if relationships exist between the dependent variable of rural southeastern high school teachers' Stage of Adoption of 1:1 technology into pedagogies and independent variables based on the Technology Acceptance Model as well as organizational factors, and teacher characteristics. To investigate possible relationships, the researcher collected data through an online survey tool. Descriptive statistics, Pearson correlations, and linear regressions were conducted for data related to each research question.

CHAPTER IV

RESULTS

As stated in Chapter I, this quantitative research study utilized an online survey instrument to examine the dependent variable, teachers' stated level of adoption (SA) of 1:1 technology into classroom pedagogies, for possible relationships to the independent variables of teachers' perceptions about the technology's usefulness (PU) and ease of use (PEoU), organizational factors, and teacher characteristics. This chapter is organized beginning with a presentation of data analysis completed via descriptive statistics, followed by data analysis related to each of the four research questions presented in Chapter I, and concluding with the most statistically significant results of Pearson correlations and the regression model created from their combination.

Descriptive Statistics

Data were collected from teachers at specific rural, southeastern high schools. The total number of survey participants was 211. The responses of 53 survey participants were deleted from the data set due to incomplete survey forms. The number of remaining responses used to comprise the study's sample was 158 ($N = 158$).

The research study focused on the dependent variable, SA, using a Likert-style scale for survey respondents to rate the adoption level of their current practice. Table 4.1 presents the SA response options and frequencies. The mean score for SA was closest to SA4: Familiarity and

confidence (*M* = 4.17, *SD* = 1.625). The median for SA was SA5: Adaptation to other contexts (*Median* = 5). The mode for SA was identical for SA5: Adaptation to other contexts and SA6: Creative application to new contexts (*Mode* = 5, 6). The results show that for this study, teachers who were most comfortable with 1:1 technology use, having more completely adopted its use into classroom pedagogies, comprised the greatest number of survey respondents. This factor may have resulted in a biasing effect on the data that were collected. Table 4.1 lists the Stages of Adoption and response frequencies.

Table 4.1 Stage of Adoption (SA) Survey Response Options and Frequencies

Stage of Adoption	*N*	%
Stage 1 (SA1): Awareness	13	8.2
Stage 2 (SA2): Learning the process	17	10.8
Stage 3 (SA3): Understanding and application of the process	23	14.6
Stage 4 (SA4): Familiarity and confidence	23	14.6
Stage 5 (SA5): Adaptation to other contexts	41	25.9
Stage 6 (SA6): Creative application to new contexts	41	25.9

Descriptive statistics were analyzed to examine teacher characteristics, including cumulative years of teaching, gender identity, age group, highest level of education attained, and subject taught. The mode for cumulative years of teaching was 11 – 20 years, with respondents sharing an average number of years teaching of 11 years (*Mode* = 4; *M* = 3.83). Teachers reporting their gender identity as female were the larger group of respondents, comprising 68% of the total (*M* = 1.7). The age group from whom the greatest number of responses was supplied

were teachers between 30 – 49 years (*M* = 2.79). The mode for highest level of education attained was 3, indicating that most respondents held a Specialist's degree or had completed 30+ hours of course work beyond (*M* = 2.26). Respondents most frequently reported teaching within the following subject areas: mathematics (*N* = 35), science (*N* = 23), and English (*N* = 22). Table D.1 in Appendix D lists the summary of the descriptive statistics for teacher characteristics.

Findings indicated that many respondents had little to no experience with 1:1 technology in the role of student. The number of participants reporting having had no amount of experience with 1:1 technology in the role of student was 34.6% (*M* = 2.3), with 27% indicating that they had only a little experience. Conversely, only 17.6% reported having a lot or a great deal of experience. Table 4.2 lists the frequencies for data analysis of teachers' experience with 1:1 technology as students.

Table 4.2 Teachers' Experience with 1:1 Technology in the Role of Student

Experience with 1:1 technology in the role of student	*N*	%
No experience at all	55	34.8
A little experience	43	27.2
A moderate amount of experience	32	20.3
A lot of experience	13	8.2
A great deal of experience	15	9.5

Research Question 1

Is there a relationship between teachers' perceptions of the usefulness of 1:1 technology in classroom activities and stage of adoption?

The descriptive statistics related to RQ1 are included as Table D.2 of Appendix D. A Pearson correlation was conducted to determine if a relationship existed between PU and SA. There was a strong, positive correlation between the independent variables related to PU and the dependent variable, SA. The correlation was statistically significant ($r = .674$, $N = 158$, $p < .001$). Appendix E contains the table of correlations.

A multivariate linear regression was calculated to examine whether the dependent variable could be predicted by the independent variables related to teachers' reported PU. The regression model was found to be significant ($F = 15.373$; $p < .001$). Perceptions of 1:1 technology's usefulness accounted for 45% of the variation in SA with adjusted $R^2 = 42\%$. PU statistically significantly predicted SA, $p < .001$. Table F.1 in Appendix F depicts the model summary for RQ1. Table 4.3 provides a summary of the data analysis.

Table 4.3 RQ1 Teachers' Overall Perception of Usefulness (PU) and Stage of Adoption (SA)

Model RQ1	Unstandardized Coefficients *b*	Std. Error	Standardized Coefficients β	Sig. (*p*)
(Constant)	-.153	.536		.775
Impact of Tech on Teaching Student Centered	.256	.127	.160	.046
Impact of Tech on Teaching Routine Use	-.011	.078	-.009	.891
Impact of Tech on Teaching is Positive	.844	.160	.526	.000
Impact of Tech on teaching Increases Student Collaboration	-.113	.156	-.078	.471
Impact of Tech on Students Impacts Collaboration	-.041	.153	-.027	.790
Impact of Tech on Students is Positive	.361	.148	.230	.016
Impact of Tech on Students Improved Work Quality	-.107	.129	-.073	.408
Tech is USEFUL as a teaching tool	-.053	.162	-.029	.746

Note: $R^2 = .45$; $\Delta R^2 = .42$ ($p < .001$)

Research Question 2

Is there a relationship between teachers' perception of the ease of use of 1:1 technology in classroom activities and stage of adoption?

The descriptive statistics related to RQ2 are included as Table D.3 of Appendix D. A Pearson correlation was run to determine if there is a relationship between the independent variables related to PEoU and the dependent variable, SA. A strong, positive correlation was found between the variables related to PEoU and the dependent variable, SA. The correlation was statistically significant (r = .606, N = 158, p < .001). Appendix E presents the table of correlations.

A multivariate linear regression was also conducted to examine whether the dependent variable, SA, might be predicted by the independent variables related to PEoU. Teachers' overall perceptions of the usefulness of 1:1 technology accounted for 51% of the variation in stage of adoption with adjusted R^2 = 47%. The regression model was found to be significant (F = 14.943; p < .001). Teachers' perceptions of 1:1 technology's ease of use statistically significantly predicted SA, p < .001. Table F.2 in Appendix F includes the model summary. Table 4.4 depicts a summary of the data analysis related to PEoU and SA.

Table 4.4 RQ2 Teachers' Overall Perception of Ease of Use (PEoU) and Stage of Adoption (SA)

Model RQ2	Unstandardized Coefficients *b*	Unstandardized Coefficients Std. Error	Standardized Coefficients β	Sig. (*p*)
(Constant)	-1.682	.731		.023
Impact of Tech on Students Capable to Use	.166	.131	.090	.206
Teacher Readiness Sufficiently Knowledgeable	.293	.177	.175	.100
Teacher Readiness Tech Alignment with Standards	.158	.181	.085	.384
Teacher Readiness to Use Tech Sufficient Training	.008	.122	.006	.945
Teacher Readiness with Tech Adequate Skills to Teach Using It	.337	.153	.174	.029
Technical Support Machines in Working Condition	-.517	.153	-.258	.001
Technical Support Questions Get Answered	.249	.137	.140	.071
Technical Support Sufficient Resources for Teachers	.410	.152	.261	.008
Technical Support Sufficient Resources for Students like Printers and Software	-.081	.120	-.060	.502
Tech Is Easy to Use as a Teaching Tool	.410	.124	.274	.001

Note: $R^2 = .506$; $\Delta R^2 = .472$ ($p < .001$)

Research Question 3

Is there a relationship between organizational factors and teachers' stage of adoption of 1:1 technology in classroom activities?

Descriptive statistics related to RQ3 are included as Table D.4 of Appendix D. A Pearson correlation was run to determine the relationship between the dependent variable, SA, and the group of independent variables related to organizational factors. There was a positive correlation between the dependent variable, SA, and the independent variable, organizational factors, and it was statistically significant ($r = .303$, N = 158, $p = .011$). Appendix E includes the table of correlations. Table F.3 in Appendix F provides the model summary for Research Question 3.

A multivariate linear regression was also conducted to examine whether SA might be predicted by the independent variable, organizational factors. Organizational factors accounted for 9.2% of the variation in SA with adjusted R^2 = 6.2%. The regression model was found to be statistically significant (F = 3.071; p = .011). Organizational factors significantly predicted SA. Table 4.5 lists the variables that were included in the group.

Table 4.5 RQ3 Teachers' Perception of Organizational Factors and Stage of Adoption (SA)

	Unstandardized Coefficients		Standardized Coefficients	Sig.
Model RQ3	*b*	Std. Error	β	(*p*)
(Constant)	1.827	.700		.010
Overall Support from Caregivers	.213	.283	.114	.455
Overall Support from Community	.068	.272	.038	.802
Overall Support Tech Plan	.231	.180	.152	.202
Overall Support from Teachers	.050	.193	.026	.795
Overall Support from Administrators	.035	.172	.021	.837

Note: R^2 = .092; ΔR^2 = .062 (p = .011)

Research Question 4

Is there a relationship between teacher characteristics and stage of adoption of 1:1 technology in classroom activities?

Descriptive statistics related to RQ4 are included in Table D.5 of Appendix D. A Pearson correlation was run to determine if there was a relationship between the dependent variable, SA, and the independent variables related to teacher characteristics. There was a positive correlation between SA and teacher characteristics; it was statistically significant (r = .370, N = 158, p = .01). The table of correlations is included in Appendix E. The model summary is included in Table F.4 in Appendix F.

A multivariate linear regression was also conducted to examine whether the dependent variable, SA, might be predicted by the independent variables related to teacher characteristics. Teacher characteristics accounted for 13.7% of the variation in SA with adjusted R^2 = 8.8%. The regression model was found to be statistically significant (F = 2.808; p = .010). Table 4.6 lists the summary of the analysis of teacher characteristics variables.

Table 4.6 RQ4 Teacher Characteristics and Stage of Adoption (SA)

Model RQ4	Unstandardized Coefficients *b*	Std. Error	Standardized Coefficients β	Sig. (*p*)
(Constant)	4.134	.984		.000
Cumulative Years as Teacher	-.201	.210	-.125	.340
Amount of Experiencing 1:1 Technology as a Student	.375	.107	.299	.001
Teachers' Age	-.033	.173	-.023	.848
Teachers' Gender	.257	.316	.070	.417
Teachers' Highest Educational Attainment	.018	.183	.010	.920
One Subject Taught	-.063	.051	-.116	.220
Multiple Course Levels Taught	-.230	.304	-.069	.450

Note: R^2 = .137; ΔR^2 = .088 (p = .010)

Additional Statistically Significant Correlations and Regressions

A Pearson correlation was run on the dependent variable, SA, and independent variables to investigate possible relationships. The table of the correlations in included in Appendix E. The Pearson correlation coefficient (*R)* between the dependent variable, SA, and independent variables measured the strength of association between the variables. The most significant correlations are listed in descending order in Table 4.7.

Table 4.7 Independent Variables Statistically Significantly Correlated with Stage of Adoption

Variables with High Correlations to SA	*r*
Impact of Tech on Teaching is Positive	.638
1:1 Technology is Easy to Use as a Teaching Tool	.590
Teacher Readiness: Sufficiently Knowledgeable to Teach with 1:1 Technology	.580
Impact of 1:1 Technology on Students is Positive	.551
Teacher Readiness: Can Align 1:1 Technology with Learning Standards	.504
Teacher Readiness: Adequate Skills to Teach Using 1:1 Technology	.473

The group of independent variables combined showed a strong positive correlation with Stage of Adoption (R = .727). Table 4.8 contains the model of the regression analysis performed on the variables having the strongest correlation with stage of adoption. The variables are listed in descending order by strength of correlation.

Table 4.8 Regression Analysis of Variables with Highest Correlation to Stage of Adoption

	Unstandardized Coefficients		Standardized Coefficients	Sig.
Model: Variables with High Correlations	*b*	Std. Error	β	(*p*)
(Constant)	-1.646	.536		.003
Impact of Tech on Teaching is Positive	.495	.134	.309	.000
Tech is Easy to Use as a Teaching Tool	.205	.127	.137	.110
Teacher Readiness: Sufficiently Knowledgeable	.364	.166	.217	.030
Impact of Tech on Students is Positive	.210	.126	.134	.098
Teacher Readiness Tech Alignment with Standards	.010	.170	.005	.954
Teacher Readiness with Tech Adequate Skills to Teach Using It	.199	.136	.103	.146

Note: R^2 = .529; ΔR^2 = .510 (p <.001)

Multivariate regression analyses were conducted on the group of independent variables that were identified as having the strongest correlation with SA. The resulting regression model accounted for 52.9% of the variation in teachers' stage of adoption, with adjusted R2 = 51%. The regression model was found to be statistically significant (F = 28.066; (p < .001). Table 4.9 depicts the regression model summary.

Table 4.9 Regression Model: Variables with Highest Correlation to Stage of Adoption

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
Variables Most Highly Correlated with SA	.727[a]	.529	.510	1.132

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig. (*p*)
Regression	215.973	6	35.996	28.066	.000[b]
Residual	192.383	150	1.283		
Total	408.357	156			

Dependent Variable: Stage of Adoption
Predictors: (Constant), Teacher Readiness with Tech Adequate Skills to Teach Using It, Impact of Tech on Students is Positive, Teacher Readiness Sufficiently Knowledgeable, Impact of Tech on Teaching is Positive, Tech is EASY to USE as a teaching tool, Teacher Readiness Tech Alignment with Standards

Summary of the Chapter

Chapter IV provided a description of the analyses used to conduct research related to this study and its guiding research questions. The data provided within the chapter's tables and the associated analyses support the conclusions, implications, and recommendations presented in Chapter V. The results of the study allowed for the following general conclusions. For Research

Question 1, the Pearson correlation revealed a statistically significant relationship, and the multivariate linear regression indicated that the dependent variable, SA, was predicted by the independent variable, PU. For Research Question 2, the Pearson correlation revealed a statistically significant relationship, and the multivariate linear regression indicated that the dependent variable, SA, was predicted by the independent variable, PEoU. For Research Question 3, the Pearson correlation revealed a statistically significant relationship, and the multivariate linear regression indicated that the independent variable, organizational characteristics, had significant predictive power in relation to the dependent variable, SA. For Research Question 4, the Pearson correlation revealed a statistically significant relationship, and the multivariate linear regression indicated that the dependent variable, SA, was predicted by the independent variable, teacher characteristics.

CHAPTER V

SUMMARY AND DISCUSSION

This study was conducted to explore possible relationships between the rate of teachers' adoption of 1:1 technology in classroom pedagogies and various organizational and teacher characteristics. Chapter V includes a reiteration of the statement of the problem, a review of the study's methodology, and a summary of the results. It then presents a discussion of the results that includes an interpretation of the findings as they relate to the study's guiding research questions, the implications of the data on the research question, the relationship of this study to the literature review and previous research, and suggestions for additional research.

Statement of the Problem

Proponents of technology use in education posit that providing 1:1 technology for student use will be beneficial in classroom learning activities, and therefore, teachers should be motivated to adopt the tool and incorporate it into their curricula (Grimes & Warschauer, 2008; Lowther et al., 2012; Roehl et al., 2013). Teachers of the millennial generation not only have to teach subject matter, but must also combat the growing problem of student apathy toward education (Cutler, 2007). According to technology advocates, use of 1:1 technology will counteract student passivity by equipping them with the capability to readily access information, conduct research, organize assignments, and collaborate with peers (Mouza, 2008). Improvements in academic achievement, technology equity, student interest, and communication

capabilities have been identified as positive aspects of 1:1 technology initiatives (Grant et al., 2005; Holcomb, 2009). However, despite these reported benefits, many teachers remain reluctant to change existing practices to include use of mobile learning devices as part of classroom activities (Al-Zaidiyeen et al., 2010; Grant et al., 2005; Howley et al., 2011; Tallvid, 2016).

The integration of 1:1 technology into instructional pedagogies is directly related to teachers' willingness to accept the change (Knezek & Christensen, 2016; Sahin et al., 2016). Based on the Technology Acceptance Model (TAM), teachers' integration of digital devices into students' class work is dependent on their perceptions of the tool's usefulness and ease of use (Davis, 1989; Montazemi & Qahri-Saremi, 2015). Teachers' adoption of 1:1 technology needed to be examined in relation to their attitudes toward and use of digital devices during class, organizational factors, and teacher characteristics (Lowther et al., 2008). Providing teachers and students with digital devices for class use is merely one step in the process of integrating 1:1 technology into curriculum and pedagogies (Silvernail & Buffington, 2009). The investigation into teachers' experiences and perspectives concerning 1:1 technology integration into curriculum and pedagogies revealed insights into the realities of their acceptance of the changes accompanying the initiative.

Review of the Methodology

As explained in Chapter III, this quantitative research study utilized an online survey instrument for data collection. High school teachers in the rural, southeastern United States provided their perceptions of ease of use and usefulness of 1:1 technology, organizational factors, personal characteristics, and stage of adoption. The online survey elicited 211 responses; however, some of those respondents did not supply answers to 50% or more of the survey items,

and their data were therefore eliminated, resulting in a final sample size of 158 responses. The research utilized descriptive statistics, Pearson correlations, and regression analysis to investigate possible relationships between the dependent variable, teachers' stated adoption rates, and the independent variables.

Summary of the Results

This section focuses on the results detailed in Chapter IV. Information is included concerning how data were analyzed to answer the study's four research questions. The summary is followed by a discussion of the results including an interpretation of the findings, the implications of the data, the relationship of this study to the literature review and previous research, and suggestions for additional research.

The research tool collected data from teachers at specific rural, southeastern high schools where 1:1 technology initiatives allow teachers to use of the tool for classroom activities. The findings suggest that teachers' adoption of 1:1 technology may be related to their perceptions of its usefulness and ease of use, as suggested by the Technology Acceptance Model (Davis, 1989; Marangunic & Granic, 2015). Data analysis also indicated that relationships between organizational factors and teacher characteristics and Stage of Adoption exist.

Discussion of the Results

The data were analyzed via descriptive statistics, Pearson correlations, and linear regression. The findings are discussed in this section in the same order as the analyses were presented in Chapter IV, beginning with findings through descriptive statistics. That section is followed by discussion of the analyses related to each of the four research questions as presented

in Chapters I and IV. The section concluded with a presentation of the most statistically significant results of Pearson correlations. It provided the multivariate linear regression model created from the independent variables that had the strongest relationship to the dependent variable, Stage of Adoption.

Most of the survey respondents reported their SA as SA3, SA4, SA5, or SA6, the four upper levels of the SA scale, These groups of respondents identified their current practice as comfortable with 1:1 technology use, and this factor may have caused sample bias that could have affected the findings (Plous, 1993; Speirs-Bridge et al., 2010). Most teachers who responded to the survey were females with 11–20 years of teaching experience, aged 30–49, and holding a Master's degrees or higher.

The researcher answered the study's four guiding research questions via Pearson correlations to determine if relationships exist between the dependent variable, Stage of Adoption (SA), and the independent variables corresponding to each research question. A multivariate linear regression was also conducted to determine if the dependent variable, SA, might be predicted by independent variables. The Pearson correlation results were also analyzed to identify the independent variables with the strongest relationships to SA. An additional multivariate linear regression was performed using the dependent variable, SA, and the identified independent variables with the strongest correlations.

Interpretation of the Findings

The investigation of teachers' perceptions concerning 1:1 technology use in class activities and their stage of adoption of the technology integration resulted in data that may have been subject to sample bias (Plous, 1993). Sample bias occurs when a segment of the study's

population is over- or underrepresented within the sample (Plous, 1993; Speirs-Bridge et al., 2010). Due to the survey's topic, 1:1 technology, it is possible that potential respondents who are not proponents of 1:1 technology chose not to participate, and subsequently, that group may have been underrepresented in the sample. Additionally, a disproportionate number of teachers who feel favorably about 1:1 technology use may have elected to participate, causing over-representation of some adopter groups. Either circumstance could have led to sample bias that may have impacted the data. Therefore, the statistically significant findings showing strong correlation between PU and SA and between PEoU and SA may reflect respondents' affinity for 1:1 technology use and may cause the findings to appear indicative of higher adoption stages or higher ratings of PU and PEoU than might be accurate. Data analysis indicated that both PU and PEoU were strongly correlated to SA and were statistically predictive of SA.

Data analysis conducted to determine if relationships existed between SA and organizational factors also revealed a positive correlation. Findings showed a statistically predictive relationship between the dependent variable, SA, and organizational factors. Organizational factors that were included in the analysis focused on teachers' perceptions of support of the 1:1 technology program from the community, students' caregivers, school administration, the technology department, and colleagues.

Analysis of the data also indicated that a relationship exists between SA and teacher characteristics, although this finding is also subject to have been affected by sample bias. The over- or underrepresentation of participants implementing 1:1 technology in students' class work may have somehow corresponded with teacher characteristics. This could have caused the study's data to be misrepresentative of the population. The characteristics utilized in the analysis included cumulative years of teaching experience, age group, gender, and educational

attainment. Teacher characteristics were found to be statistically predictive of SA. Findings also showed a relationship between teachers' experience of 1:1 technology as students and their incorporation of the tool into pedagogy.

Relationship of the Current Study to the Literature Review and Previous Research

In the Diffusion of Innovation Theory, Rogers (2003) stated that people will respond to innovations at different rates. Adopter groups range in speed of undertaking utilization of the new product. The research study's findings suggest that teachers' adoption of 1:1 technology into classroom pedagogies aligns with that theory. Of the survey respondents, a total of 81% reported their current practice as in the more advanced stages of adoption. These stages are characterized by familiarity and efficacy developed through experience (Christensen, 1997), and participants in these stages may be considered to be among the early adopters identified by Bandura (2006). Members of these groups may serve as potential influencers of the survey respondents who ranked their practice at the two lowest stages of adoption. The alignment of the teacher adopter groups with those identified by Rogers (2003) seems to indicate that increased opportunities for observational learning or modeling of 1:1 technology use in classroom activities might have resulted in increasing amounts of user acceptance (Bandura, 2006).

Rogers (2003) also noted that adopters' attitudes about an innovation are formulated in part from their perceptions of its relative advantage and its complexity. These attributes are aligned with the Technology Acceptance Model's measurement of Perceived Usefulness and Perceived Ease of Use, respectively (Edmunds et al., 2012). According to Marangunic and Granic (2015), PU and PEoU influence teachers' adoption of 1:1 technology, a finding that was also indicated within the current research study. The variables PU and PEoU, key elements of the

research study, were measured by several survey instrument statements. Eight items on the survey were used to investigate PU, and 10 items addressed PEoU. Both PU and PEoU were found to be statistically significant by correlation and linear regression analyses, indicating alignment with the Technology Acceptance Model (Persico et al., 2014; Schepers & Wetzels, 2007b) as identifiable predictors of Stage of Adoption.

More than 84% of the current study's survey participants indicated that they belong to generations preceding the digital era. These digital immigrants' adoption of 1:1 technology is related to PU and PEoU. Their adoption of 1:1 technology for class work, in turn, affects their students, digital natives who find its use more appealing than traditional class work (Gu et al., 2013). According to the findings of the current study, teachers' willingness to integrate 1:1 technology into pedagogies seems to be related to PU and PEoU (Ertmer et al., 2012; Toru et al., 2006). Deliberate steps to positively affect the ZPD of those teachers who are classified as digital immigrants may aid in their development of perceptions of the tool's usefulness and ease of use (Warford, 2011).

Learning occurs within contexts, and learners' experiences are a function of their creation of understandings during the learning (Gilakjani, Lai-Mei, & Ismail, 2013). Technology as a learning platform allows teachers to meet the unique needs of millennial students (Christensen et al., 2011; Gilakjani et al., 2013; Hop & Delver, 2011; Sorenson et al., 2011). Vygotsky (as cited in Mariotti, 2009) theorized that educational tools shape the experiences of learners. This emphasizes the potential importance of 1:1 technology adoption into classroom activities to shape the experience of millennial learners for the ubiquitous technology anticipated as part of their future employment (Shabani et al., 2010).

Survey respondents reported perceptions that using 1:1 technology had a positive effect on their teaching and their students. These perceptions had a significant correlation with Stage of Adoption. Participants also reported that 1:1 technology-based activities allow class work to be more student-centered, more collaborative, and more interactive. The 1:1 technology allows development of constructivist teaching practices, providing opportunities for students to learn through observation, modeling, and collaboration (Gilakjani et al., 2013). Using 1:1 technology to facilitate student learning through constructivism allows teachers to better meet the needs of millennial students (Barrett et al., 2015; Christensen et al., 2011; Sorenson et al., 2011). This benefit is reflected in respondents' perception of the usefulness of 1:1 technology in pedagogies, with PU accounting for 45% of the variation in teachers' stage of adoption. Use of 1:1 technology had a positive relationship with both teaching practices and student learning opportunities, study findings that support conclusions found in the literature review and prior research.

Finally, analysis of data collected for this research study showed a correlation between SA and teachers' amount of experience as students using 1:1 technology themselves. Prior research also identified this relationship (Chintalapati & Daruri, 2016; Penuel et al., 2007; Polly & Hannafin, 2010; Van Es & Sherin, 2008). The ZPD (Vygotsky, 1978) of survey respondents may have been positively influenced by their schools' organizational culture (Shabani et al., 2010; Zuber & Anderson, 2013). The findings of this research study indicate that teachers' workplaces may espouse organizational objectives and values that focus on 1:1 technology use. The values and objectives espoused as part of the organizational culture have been found in previous research to be related to teachers' willingness to adopt innovation (Shabani et al., 2010; Zuber & Anderson, 2013). In the current study, respondents' perceptions of organizational

support were measured by five survey items, and correlation analysis identified positive relationships between SA and teachers' perceptions of support for the 1:1 initiative at their school from administrators, colleagues, the technical support program, community stakeholders, and students' caregivers. These findings suggest that organizational culture has been related to teachers' adoption of the initiative.

Implications for Practice

The findings of this research study were based on analyses of data collected from high school teachers who experienced the opportunity to incorporate 1:1 technology use into classroom activities. Several aspects of this study's findings may be connected to ideas presented in previous research and theories, including the Technology Acceptance Model (Akman & Turhan, 2015; Davis, 1989; Edmunds et al., 2012; Evans et al., 2014; Marangunic & Granic, 2015), the Zone of Proximal Development theory (Shabani et al., 2010; Warford, 2011), Diffusion of Innovation theory (Morris, 2011; Rogers, 2003), the influence of organizational culture on adoption of innovation (Eastman et al., 2014; Morris, 2011; Rogers, 2003), and the benefits of constructivist teaching practices (Gilakjani et al., 2013; Keengwe & Onchwari, 2008; Overbay et al., 2010) and 1:1 technology for millennial students (Felix, 2005; Gilakjani et al., 2013). These connections lead to several implications for practices that might benefit student learning opportunities.

Survey respondents indicated that, as predicted by the Technology Acceptance Model, teachers' perceptions of the ease of use and usefulness of 1:1 technology were predictive of Stage of Adoption. The development of positive views of the tool's relative advantage, compatibility, complexity, and trialability (Rogers, 2003) appears to contribute to teachers'

willingness to adopt it for classroom use. Exposure to 1:1 technology's benefits as a learning platform results in greater interest and efficacy in its use in pedagogy (Gilakjani et al., 2013). The implications of these positive perceptions' relationships with adoption reflect a potential need for benefits to be publicly recognized, modeled, and promoted to raise teachers' awareness of the usefulness and ease of use of mobile learning devices in classroom activities.

Additionally, findings in the current study indicated that 62% of respondents had little to no experience with 1:1 technology as a student, although it was also indicated that experiencing 1:1 technology as a student was predictive of teachers' stage of adoption. Teachers' experiences with 1:1 technology in the role of student will expand their ZPD (Daniels, 2016; Moll, 2014), thereby increasing efficacy, and subsequently, greater adoption of the 1:1 technology. Implications for professional practice include a continuing need for teachers to be provided with professional development and training opportunities that will allow them to experience 1:1 technology as learners.

Data analysis within the current research study identified significant positive relationships between Stage of Adoption and teachers' perceptions of their preparedness to utilize the technology to facilitate student learning. Correlations were identified with perceptions of teachers' readiness in relation to their knowledge of the tool, skills to facilitate student learning via the tool, and ability to align 1:1 technology use with learning standards. The implication exists that the more learning opportunities teachers are provided with, the more comfortable they will be with facilitating learning opportunities for their students. The study's findings suggest that decision makers who undertake development of mentoring programs or teacher training opportunities may create greater confidence in faculty and therefore may see greater adoption of the technology in pedagogies.

An additional implication of the research study's findings relates to the creation of awareness of 1:1 technology's usefulness and ease of use. Change agents who actively promote and publicize the benefits of 1:1 technology for both teachers and students may inspire greater acceptance of the innovation. Promotion of an organizational culture that values constructivist teaching practices and 1:1 technology use may encourage more faculty members to participate. Findings from this research study indicated that teachers' perceptions of support of their schools' 1:1 technology program have an interactive relationship to their stage of adoption. This study's data analyses revealed positive relationships between teachers' stage of adoption and their perceptions of the 1:1 technology initiative's support from the community, students' caregivers, school administrators, colleagues, and the technical support team. That support is a characteristic of the schools' organizational culture. Organizational culture creates a shared group identity and a sense of commitment to organizational goals, functioning as a key component of organizational change (Schein, 2010). School leaders striving to encourage their organizations' greater adoption of 1:1 technology initiatives may better enact that change through promotion of a culture in which 1:1 technology use is actively promoted. Organizational change occurs when the organization's objectives are clarified and its members are actively encouraged to embrace its values (Burke, 2014), making recognition of the importance of teachers' perceptions of organizational support a key implication of this study.

Another implication of the study is related to teachers' understandings of the specific needs of their millennial students. Prior research evidenced that constructivist practices allow students to formulate their own understandings through collaboration and interactive learning. Survey respondents indicated their recognition of the 1:1 technology's use in achieving positive results for their students in that respect. Providing observational learning opportunities for

faculty members who have yet to attempt incorporation of the tool into pedagogies and publicizing its benefits may have a positive effect on increasing adoption rates.

Recommendations for Further Research

Most teachers who responded to the online survey reported their Stage of Adoption (SA) as at one of the four upper levels. This finding suggests that instructors' ZPD allowed them to feel comfortable utilizing 1:1 technology in pedagogy. However, most participants reported that they had not experienced 1:1 technology use in the role of student. The elimination of this independent variable as a possible predictor of SA leaves a question unanswered about how teachers advance into a ZPD that allows them to feel confident in using 1:1 technology in classroom activities. Further research might investigate the means through which teachers developed such efficacy. This could inform future decisions regarding teacher development of confidence in the incorporation of 1:1 technology in pedagogies. Further research may be needed to identify other factors that affect ZPD and thereby encourage or discourage adoption. The study's research tool was not designed to investigate the extent of teachers' participation in training, professional development, and mentoring programs. Therefore, potential additional experiences that resulted in teachers' ZPD and provided them with efficacy needed to use the tool for teaching remain unidentified.

Additional research may be needed on the specific pedagogies that teachers identify as best practices for their curriculum and standards. The investigation of adoption and perceptions of the technology's ease of use and usefulness within this study suggests that some teachers have developed more effective practices than others or have access to resources that might be more beneficial than those in place for instructors elsewhere. Identification of activities that best

address student needs and interests could be valuable to decision makers and instructional designers.

Development of an organizational culture that encourages teachers' incorporation of 1:1 technology into pedagogies is another area in which additional research might provide answers. Positive relationships were found in the Pearson correlations between the independent variables associated with organizational characteristics and SA. These findings suggest that investigations into effective communication of support of 1:1 technology initiatives might be beneficial. Exploring specific ways through which teachers recognize support of 1:1 technology use in class activities by their students' caregivers, the community, their school administrators, their colleagues, and their technical support team might allow the development of programs or practices to increase either support or teachers' recognition of support. Greater 1:1 technology adoption might result from such research.

Research might also be conducted to investigate the role of leadership in successful integration of 1:1 technology into pedagogies. Leadership styles and practices of school superintendents and principals related to adoption might be identified. Such research could inform decisions concerning means of increasing adoption and thereby better meeting the needs of millennial students.

Additionally, the body of knowledge on 1:1 technology use in classroom activities might benefit from the development of a study that could be conducted with a larger sample. When considering the findings of this study, the small sample size must be recognized as a possible limitation of their generalizability. Several factors may have contributed to the small sample size, such as principals not emphasizing the importance of the study when sharing the survey link with faculty members, the survey's deployment at the beginning of the school year resulting in

teachers being too busy to participate, teachers not understanding the importance of the study, and the relatively small number of high schools whose administrators agreed to participation. A future study with a larger sample of high school teachers might achieve more generalizable study findings.

Finally, a study focused on students' perceptions of their teachers' adoption of 1:1 technology into classroom activities might also provide helpful information. Data collection from students might potentially be triangulated between teachers' self-reports of integration of 1:1 technology in pedagogies and learners' perceptions of its utilization. Such research may inform strategies and practices that might benefit students' future learning experiences.

Conclusions of the Study

Providing 1:1 technology availability may be a key to better meeting the learning needs of millennial students. The ubiquitous existence of technology in almost every aspect of life makes its use requisite in the education of present and future generations. Learning that occurs via 1:1 technology not only prepares students for future employment, education, and societal demands, it also affords opportunities for students to construct their own understandings through collaboration and investigation. Such constructivist practices better engage millennial learners and lead to increased academic achievement (Gilakjani et al., 2013; Keengwe & Onchwari, 2008). This study identified relationships between teachers' stage of 1:1 technology adoption and their perceptions of its usefulness, ease of use, as well as perceptions of organizational factors and characteristics of the teachers themselves.

Perceived usefulness and perceived ease of use of 1:1 technology were statistically predictive of stage of adoption at a $p < .05$ value, indicating that change agents' consideration of

professional development, mentoring programs, and training opportunities may be key considerations for the encouragement of adoption. Additionally, cultivation of an organizational culture that communicates the values and objectives associated with utilization of 1:1 technology in pedagogies may contribute to improved student learning opportunities through greater integration of the technology into curriculum and instruction.

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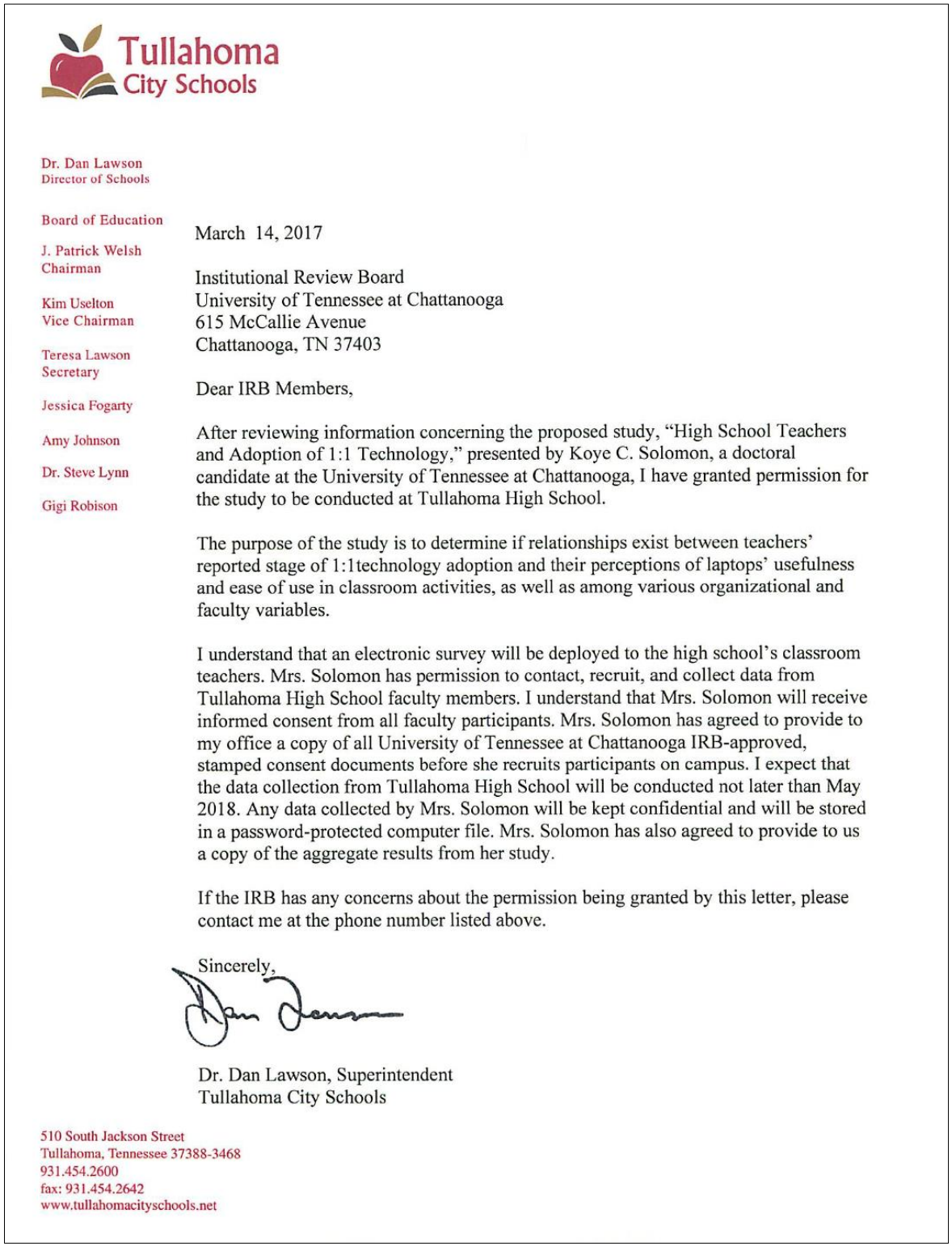
APPENDIX A

RESEARCH SITE APPROVAL LETTERS

Letter of Approval from Tullahoma City Schools Superintendent:



Tullahoma City Schools

March 14, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at Tullahoma High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Tullahoma High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Tullahoma High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Dr. Dan Lawson, Superintendent
Tullahoma City Schools

510 South Jackson Street
Tullahoma, Tennessee 37388-3468
931.454.2600
fax: 931.454.2642
www.tullahomacityschools.net

Letter of Approval from Tullahoma High School Principal:

TULLAHOMA HIGH SCHOOL
927 NORTH JACKSON STREET
TULLAHOMA, TN 37388-4357
931-454-2620
FAX 931-454-2662
www.tullahomacityschools.net

February 21, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that the school superintendent Dr. Dan Lawson, approves the proposal, I have granted permission for the study to be conducted at Tullahoma High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities,as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Tullahoma High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Tullahoma High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Kathryn Rose

Kathryn Rose, Principal
Tullahoma High School

Letter of Approval from Director of Moore County School District

Moore County Schools

Lynchburg, Tennessee
Chad Moorehead, Director of Schools

March 9, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that the school principal also approves the proposal, I have granted permission for data to be collected for the study at Moore County High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Moore County High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Moore High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

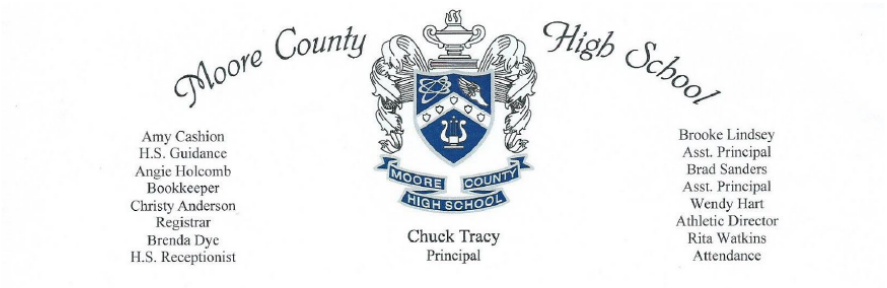
If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Chad Moorehead
Director of Schools

Phone: 931.759.7303
P.O. Box 219
Lynchburg, TN 37352
www.moorecountyschools.net

Letter of from Moore County High School Principal



March 13, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that Director of Schools, Mr. Chad Moorehead, also approves the proposal, I have granted permission for the study to be conducted at Moore County High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Moore County High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Moore County High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Charles R Tracy

Charles Tracy, Principal
Moore County High School

Letter of Approval from Franklin County Director of Schools

Franklin County
Board of Education

215 South College Street
Winchester, TN 37398

Telephone (931) 967-0626
Fax (931) 967-7832

March 14, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that the school principal, Dr. Roger Alsup, also approves the proposal, I have granted permission for data to be collected for the study at Franklin County High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Franklin County High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Franklin High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Amie W. Lonas

Dr. Amie W. Lonas, Director of Schools
Franklin County School District

Letter of Approval from Franklin County High School Principal

Franklin County High School

833 Bypass Rd
Winchester, TN 37398
(931) 967-2821
(931) 967-6945 fax

Dr. Roger D. Alsup
Principal

Assistant Principals
Lisa Crabtree
Chris Hobbs
Allan Weinberg

Thursday, March 9, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that Director of Schools, Dr. Amie Lonas, also approves the proposal, I have granted permission for the study to be conducted at Franklin County High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Franklin County High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Franklin County High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above. Sincerely,

Roger D. Alsup, Ed. D.
Franklin County High School Principal

Letter of Approval from Director of Sevier County Schools

Sevier County School System

Dr. Jack A. Parton, Director of Schools

226 Cedar Street
Sevierville, Tennessee 37862

Phone : (865) 453-4671
Fax : (865) 522-1497

March 23, 2017

Institutional Review Board

University of Tennessee at Chattanooga

615 McCallie Avenue

Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that the school principal also approves the proposal, I have granted permission for data to be collected for the study at Sevier County's high schools.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high schools' classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from the Sevier County School District will be conducted no later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Jack Parton

Jack Parton

Director of Schools

Letter of Approval from Sevier County High School Principal

SEVIER COUNTY HIGH SCHOOL
1200 Dolly Parton Parkway
Sevierville Tennessee 37862
Phone (865) 453-5525

Toby L. Ward
Principal
Email tobyward@sevier.org

April 6, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at our school.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from our faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from our school will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

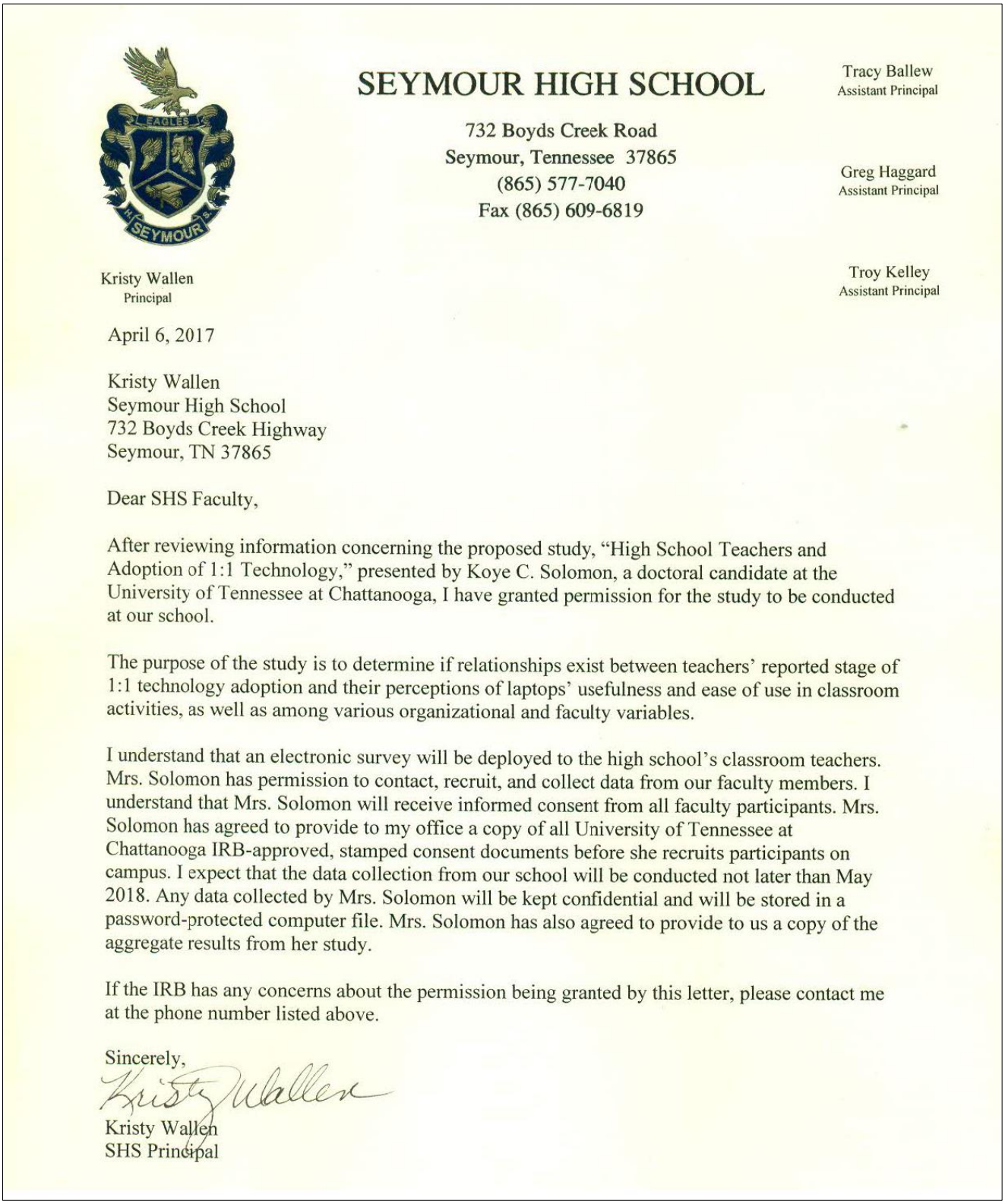
If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Toby Ward

Principal

Letter of Approval from Seymour High School Principal, also in Sevier County School System



SEYMOUR HIGH SCHOOL

732 Boyds Creek Road
Seymour, Tennessee 37865
(865) 577-7040
Fax (865) 609-6819

Tracy Ballew
Assistant Principal

Greg Haggard
Assistant Principal

Troy Kelley
Assistant Principal

Kristy Wallen
Principal

April 6, 2017

Kristy Wallen
Seymour High School
732 Boyds Creek Highway
Seymour, TN 37865

Dear SHS Faculty,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at our school.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from our faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from our school will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Kristy Wallen
SHS Principal

Letter of Approval from Director of Lincoln County School District

Lincoln County Department of Education

206 East Davidson Drive
Fayetteville, Tennessee 37334

(931) 433-3565
FAX: (931) 433-7397

Bill Heath, Ed. D.
Director

April 4, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, and verifying that the school principal also approves the proposal, I have granted permission for data to be collected for the study at Lincoln County High School and Ninth Grade Academy.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from the Lincoln County School District will be conducted no later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Bill Heath

Bill Heath
Director of Schools
Lincoln County School District

Letter of Approval from Lincoln County High School Principal

Lincoln County High School

1233 Huntsville Highway
Fayetteville, Tennessee 37334
Phone: (931) 433-6505
Fax: (931) 438-1490

April 4, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at Lincoln County High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Lincoln County High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Lincoln County High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Sarah Wallace

Sarah Wallace
Lincoln County High School Principal

Letter of Approval from Lincoln County Ninth Grade Academy Principal

Lincoln County Ninth Grade Academy

NGA

900 South Main Avenue
Fayetteville, Tennessee 37334
(931) 433-6156
(931) 438-2465 - FAX

Chad Carter, Principal

Charlie Badgett, Asst. Principal / Athletic Director

Amy Clemons, Asst. Principal / Curriculum Coordinator

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at Ninth Grade Academy.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Ninth Grade Academy faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Ninth Grade Academy will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Chad Carter

Chad Carter
Ninth Grade Academy Principal

Letter of Approval from Director of Maryville City School District

Director of Schools
Mike Winstead, Ph.D.
mike.winstead@maryville-schools.org

833 Lawrence Avenue, Maryville, Tennessee 37803-4857
Tel (865) 982-7121 || Fax (865) 977-5055

Assistant Director of Schools
Rick Wilson, Ed.S.
rick.wilson@maryville-schools.org

April 11, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at Maryville High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1 technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Maryville High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Maryville High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Mike Winstead

Mike Winstead
Director of Schools

Letter of Approval from Maryville High School Principal

Maryville High School
825 Lawrence Avenue • Maryville, Tennessee 37803
(865) 982-1132 • Fax (865) 983-1440

April 17, 2017

Institutional Review Board
University of Tennessee at Chattanooga
615 McCallie Avenue
Chattanooga, TN 37403

Dear IRB Members,

After reviewing information concerning the proposed study, "High School Teachers and Adoption of 1:1 Technology," presented by Koye C. Solomon, a doctoral candidate at the University of Tennessee at Chattanooga, I have granted permission for the study to be conducted at Maryville High School.

The purpose of the study is to determine if relationships exist between teachers' reported stage of 1:1technology adoption and their perceptions of laptops' usefulness and ease of use in classroom activities, as well as among various organizational and faculty variables.

I understand that an electronic survey will be deployed to the high school's classroom teachers. Mrs. Solomon has permission to contact, recruit, and collect data from Maryville High School faculty members. I understand that Mrs. Solomon will receive informed consent from all faculty participants. Mrs. Solomon has agreed to provide to my office a copy of all University of Tennessee at Chattanooga IRB-approved, stamped consent documents before she recruits participants on campus. I expect that the data collection from Maryville High School will be conducted not later than May 2018. Any data collected by Mrs. Solomon will be kept confidential and will be stored in a password-protected computer file. Mrs. Solomon has also agreed to provide to us a copy of the aggregate results from her study.

If the IRB has any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Greg Roach

Greg Roach

Letter of Approval from Superintendent of Knox County Schools

KNOX COUNTY SCHOOLS
ANDREW JOHNSON BUILDING

Bob Thomas, Superintendent

April 24, 2017

Koye Solomon
158 Lake Haven Lane
Normandy, TN 37960

Koye Solomon:

You are granted permission to administer and use the data from the survey in your proposed research study: *High School Teachers and Adoption of 1:1 Technology.*

In all research studies names of individuals, groups, or schools may not appear in the text of the study unless specific permission has been granted through this office. The principal researcher is required to furnish this office with one copy of the completed research document.

Good luck with your study. Contact me at 865-594-1735 if you need further assistance or clarification of the research policies of Knox County Schools.

Yours truly,

John Beckett
Director
Research and Evaluation

Project Number: 161730

P.O. Box 2188 • 912 South Gay Street • Knoxville, Tennessee 37901-2188 • Telephone (865) 594-1800

APPENDIX B

INFORMATION PERTAINING TO USE OF EXISTING INSTRUMENTS: STAGES OF ADOPTION OF TECHNOLOGY SURVEY (SA) AND FREEDOM TO LEARN-TEACHER TECHNOLOGY SURVEY (FLT-TTQ)

Original Text of the Stages of Adoption of Technology Survey (SA) (Christensen, 1997).

Gender: _____ Age: ____ Years of teaching experience:_____

Highest degree received:_____ Level taught:_____

Location:_____

Do you have a computer at home?_____

Access to the World Wide Web at home?_____

Please read the descriptions of each of the levels of use of technology. Choose the stage that best describes your level.

Stage 1: Awareness
I am aware that technology exists but have not used it – perhaps I'm even avoiding it.

Stage 2: Learning the process
I am currently trying to learn the basics. I am often frustrated using computers. I lack confidence when using computers.

Stage 3: Understanding and application of the process
I am beginning to understand the process of using technology and can think of specific tasks in which it might be useful.

Stage 4: Familiarity and confidence
I am gaining a sense of confidence in using the computer for specific tasks.
I am starting to feel comfortable using the computer.

Stage 5: Adaptation to other contexts
I think about the computer as a tool to help me and am no longer concerned about it as technology. I can use it in many applications and as an instructional aid.

Stage 6: Creative application to new contexts
I can apply what I know about technology in the classroom. I am able to use it as an instructional tool and integrate it into the curriculum.

Permission to use and adapt the Stages of Technology Adoption Survey

From: Koye Solomon
To: Crawford, Elizabeth
Subject: Fwd: Permission request
Date: Saturday, May 20, 2017 13:28:20

The emailed request and subsequent permission follow. Thank you for your help with this.

---------- Forwarded message ----------
From: **Rhonda Christensen** <rhonda.christensen@gmail.com>
Date: Sun, Dec 11, 2016 at 5:11 PM
Subject: Re: Permission request
To: Koye Solomon <fgh639@mocs.utc.edu>

Hello Koye,
Yes you may use the Stages of Adoption survey instrument for your dissertation study. Please give proper credit and list it as adapted from....
Best of luck on your study. We also have a mobile learning survey we have used if you are interested.
Kind regards,
Rhonda Christensen

On Sat, Dec 10, 2016 at 1:49 PM, Koye Solomon <fgh639@mocs.utc.edu> wrote:

> Greetings! I am a doctoral student at the University of Tennessee at Chattanooga, working on a research prospectus for my dissertation. I wonder if I might obtain permission to utilize your Stages of Technology Adoption Survey (1997) and adapt it to replace generalized references to specifically address teachers' adoption of 1:1 laptops into classroom activities?
>
> Thank you for your consideration

--
****
Rhonda W. Christensen, Ph.D.
Research Scientist/Instructor
Institute for the Integration of Technology into Teaching and Learning (IITTL)
University of North Texas
Information Technology Council Chair
Society for Information Technology in Teacher Education (SITE)
Email: rhonda.christensen@gmail.com

Original Text of Freedom to Learn Teacher Technology Questionnaire (FLT-TTQ)

Below are the statements to which respondents replied on a Likert-type scale ranging from (1) *Strongly disagree* to (5) *Strongly agree* (Donovan et al., 2010).

Impact on Classroom Instruction

My teaching is more student-centered when FTL laptops are integrated into the lessons.

I routinely integrate the use of FTL laptops into my instruction.

The FTL laptop program has changed classroom learning activities in a very positive way.

My teaching is more interactive when the FTL laptops are integrated into the lessons.

Impact on Students

The use of FTL laptops has increased the level of student interaction and/or collaboration.

The integration of the FTL laptops has positively impacted student learning and achievement.

Most of my students can capably use the FTL laptops at an age-appropriate level.

The use of the FTL laptops has improved the quality of student work.

Teacher Readiness to Integrate Technology

I know how to meaningfully integrate the laptops into lessons.

I am able to align use of the FTL laptops with my district's standards-based curriculum.

I have received adequate training to incorporate the FTL laptops into my instruction.

My computer skills are adequate to conduct classes that have students using the FTL laptops.

Overall Support for Technology in the School

Parents/Caregivers and community members support our school's FTL program.

Teachers receive adequate administrative support to integrate the FTL laptops into classroom practices.

Our school has a well-developed technology plan that guides all technology integration efforts.

The FTL teachers in this school are generally supportive of the FTL laptop program.

Technical Support

Most of our FTL laptops are kept in good working condition.

I can readily obtain answers to technology-related questions.

My students have adequate access to up-to-date technology resources.

Materials (e.g., software, printer supplies) for classroom use of the FTL laptops are readily available.

Lead Teacher Effectiveness

I have frequently participated in professional development that was planned by or provided by my Lead Teacher and/or Super Coach.

I more frequently integrate technology into my instruction as a result of participating in professional development planned or provided by my Lead Teacher and/or Super Coach.

The quality of my technology integration lessons has improved as a result of participating in professional development planned or provided by my Lead Teacher and/or Super Coach.

Overall, my Lead Teacher has been a valuable asset to our school's FTL laptop program.

Freedom to Learn Teacher Technology Questionnaire (FLT-TTQ)
Instrument Usage Agreement Statement

Instrument Usage Agreement Statement

Center for Research in Educational Policy (CREP) The
University of Memphis
325 Browning Hall
Memphis, TN. 38152

By using the FTL-TTQ (Freedom to Learn Teacher Technology Questionnaire) evaluation instrument developed and wholly owned by the Center for Research in Educational Policy (CREP) at The University of Memphis, I understand and agree to the following conditions and statements:

- The instrument is protected under copyright and intellectual property laws. The instrument remains the property of the Center for Research in Educational Policy.
- This is a one-time permission for the agreed upon study. Further uses of this instrument would require similar permission.
- CREP will be cited as the instrument developers in any publication associated with the agreed upon study.
- CREP will not administer the instruments or provide data analysis unless agreed upon.
- A copy of the publication (e.g., thesis, dissertation, report) associated with this one-time instrument use will be provided to CREP.
- User certifies that all IRB requirements have been met I understand and agree to the above terms.

I understand and agree to the above terms.

KOYE SOLOMON
Printed Name

School: UNIVERSITY OF TENNESSEE AT CHATTANOOGA

Planned time (dates) of instrument administration or other description of use:
ADAPTATION OF INSTRUMENT TO ADDRESS 1:1 TECHNOLOGY INTEGRATION INTO CLASSROOM ACTIVITIES/CURRICULUM. *THE "LEAD TEACHER EFFECTIVENESS" SECTION WILL BE OMITTED. SURVEY WILL BE DIGITALLY DEPLOYED JULY/AUGUST 2017.

KSolomon
Signature

5-4-17
Date

APPENDIX C

SURVEY QUESTIONS

Q1.1 Hello, fellow educator, and thank you in advance for your assistance. This survey has been sent to you as part of dissertation research being performed by a classroom teacher and University of Tennessee Chattanooga (UTC) doctoral student, Koye Solomon. The survey takes about 5 minutes to complete. The research focuses on use of 1:1 technology-based activities as part of students' class work. Your participation in this survey is voluntary and has no risks. Potential benefits may be the identification of interventions that could positively impact 1:1 technology use in classroom activities. Information you provide will be kept confidential; all names of districts, schools, and individuals who participate in this research will be withheld from published reports. You may discontinue participation at any time. If you decide to discontinue, any information you provided will be immediately destroyed. If you have questions about the study, please contact the researcher via email: fgh639@mocs.utc.edu. This study has been approved by the UTC Institutional Review Board (IRB) #17-111. If you have any questions about your rights as a participant or feel you have been placed at risk, you may contact Dr. Amy Doolittle, IRB Human Subjects Committee Chair, at 423-425-5563 or via www.utc.edu/irb. By going forward in this survey, you are providing consent for the researcher to use your responses for the purposes of this study. Thank you again for your assistance!

- ☐ Yes, I'll help.
- ☐ No, I'm opting out.

Condition: No, I'm opting out. Is Selected. Skip To: End of Survey

Q2.1 In your role as classroom teacher, how many cumulative years of teaching experience do you have?

- ❍ Less than 1 year
- ❍ 1 - 4 years
- ❍ 5 - 10 years
- ❍ 11 - 20 years
- ❍ 21+ years

Q2.2 In your role as a classroom teacher, how many years have you taught at your present school?

- ❍ Less than 1 year
- ❍ 1 - 4 years
- ❍ 5 - 10 years
- ❍ 11 - 20 years
- ❍ 21+ years

Condition: Less than 1 year Is Selected. Skip To: End of Survey.

Q3.1 Please think about student use of 1:1 technology during classroom learning activities as you respond to the following survey questions, with 1:1 technology referring to each student having a mobile computing device such as a Chromebook, laptop, iPad, or tablet.

Q3.2 How much experience have you yourself had as a STUDENT in a classroom where 1:1 technology-based learning activities are part of the class work?

- A great deal
- A lot
- A moderate amount
- A little
- None at all

Q4.1 From the statements below, please select the option that best describes your current practice in assigning 1:1 technology-based learning activities to your students during class.

- I am aware that it is available for students to use, but I have not required students to use it.
- I am currently trying to learn the basics of having students use it. I am often frustrated and /or lack confidence when creating 1:1 technology-based activities for my students.
- I am beginning to understand the processes of integrating it. I can think of specific tasks in which it might be useful.
- I am gaining a sense of confidence about incorporating it. I am starting to feel comfortable with its use.
- I think of it as a tool to help me and am no longer concerned about it as technology. I can plan for students to use their 1:1 technology in many applications and as instructional aids.
- I can apply what I know about it in the classroom. I can easily employ 1:1 technology-based student activities during class as instructional tools, and I fully integrate 1:1 technology-based student activities into classroom curriculum.

Q5.1 Please indicate your level of agreement with the following statements in regard to the impact of 1:1 technology-based class activities on your TEACHING.

	Strongly agree (18)	Somewhat agree (19)	Neither agree nor disagree (20)	Somewhat disagree (21)	Strongly disagree (22)
It allows my teaching to be more student-centered and less lecture-based.	❍	❍	❍	❍	❍
I routinely integrate it into my instruction.	❍	❍	❍	❍	❍
It has changed my classroom's learning activities in a very positive way.	❍	❍	❍	❍	❍
It allows my students' learning activities to be more interactive and collaborative.	❍	❍	❍	❍	❍

Q6.1 Please indicate your level of agreement with the following statements in regard to the impact of 1:1 technology-based class activities on your STUDENTS.

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
It has increased the level of student interaction and/or collaboration.	❍	❍	❍	❍	❍
It has positively impacted student learning and achievement.	❍	❍	❍	❍	❍
Most of my students can capably use 1:1 technology at an age-appropriate level.	❍	❍	❍	❍	❍
It has improved the quality of my students' work.	❍	❍	❍	❍	❍

Q7.1 Please indicate your level of agreement with the following statements in regard to your READINESS to integrate 1:1 technology use into your classroom lessons.

	Strongly agree (76)	Somewhat agree (77)	Neither agree nor disagree (78)	Somewhat disagree (79)	Strongly disagree (80)
I know how to meaningfully integrate its use into my classroom lesson plans.	❍	❍	❍	❍	❍
I can align its use with my district's standards-based curriculum.	❍	❍	❍	❍	❍
I have received adequate training to incorporate it into my instruction.	❍	❍	❍	❍	❍
My computer skills are adequate to conduct classes involving it.	❍	❍	❍	❍	❍

Q8.1 Please indicate your level of agreement with the following statements in regard to OVERALL SUPPORT for 1:1 technology-based class activities.

	Strongly agree (11)	Somewhat agree (12)	Neither agree nor disagree (13)	Somewhat disagree (14)	Strongly disagree (15)
Parents/Caregivers support our school's 1:1 technology program.	❍	❍	❍	❍	❍
Community members support our school's 1:1 technology program.	❍	❍	❍	❍	❍
Our school has a well-developed technology plan that guides all technology integration efforts.	❍	❍	❍	❍	❍
The teachers in this school are generally supportive of the 1:1 technology program.	❍	❍	❍	❍	❍
Teachers receive adequate administrative support to integrate 1:1 technology into classroom practices.	❍	❍	❍	❍	❍

Q9.1 Please indicate your level of agreement with the following statements in regard to TECHNICAL SUPPORT.

	Strongly agree (11)	Somewhat agree (12)	Neither agree nor disagree (13)	Somewhat disagree (14)	Strongly disagree (15)
Most of our 1:1 devices are kept in good working condition.	❍	❍	❍	❍	❍
I can readily obtain answers to technology-related questions.	❍	❍	❍	❍	❍
My students have adequate access to up-to-date technology resources.	❍	❍	❍	❍	❍
Materials (e.g., software, printer supplies, etc.) for classroom use of the 1:1 technology are readily available.	❍	❍	❍	❍	❍

Q10.1 Please indicate your level of agreement with the following statements concerning 1:1 technology use in classroom activities.

	Strongly agree (11)	Somewhat agree (12)	Neither agree nor disagree (13)	Somewhat disagree (14)	Strongly disagree (15)
I feel that it is a very useful teaching tool.	❍	❍	❍	❍	❍
I feel that it is easy to use as a teaching tool.	❍	❍	❍	❍	❍

Q11.1 In a typical week, how often do you assign 1:1 technology-based learning activities during class?

- ❍ Daily
- ❍ 3 - 4 times /week
- ❍ 1 - 2 times /week
- ❍ 1 - 2 times /month
- ❍ Less than once per month

Q11.2 In a typical week, what portion of a class period do you allot for students to spend on 1:1 technology-based learning activities?

- ❍ all or most
- ❍ about 3/4
- ❍ about 1/2
- ❍ about 1/4
- ❍ Very little or none

Q11.3 How do your students obtain 1:1 technology for use during your class?
(Please check all that apply.)

- ❑ Students bring their self-owned devices to class.
- ❑ Students bring school-issued devices to class.
- ❑ Students use a device from my classroom's set.

Q12.1 Subject(s) I currently teach:
(Please check all that apply.)

- ❑ Mathematics
- ❑ English Language Arts
- ❑ Social Studies
- ❑ Science
- ❑ Social Sciences
- ❑ World Languages
- ❑ P.E. /Wellness
- ❑ Business /Finance
- ❑ Other

Q12.2 Grade levels of the students I currently teach:
(Please check all that apply.)

- ❑ 9
- ❑ 10
- ❑ 11
- ❑ 12

Q12.3 Course levels I currently teach:
(Please check all that apply.)

- ❑ Remedial
- ❑ Standard
- ❑ Honors
- ❑ Advance Placement
- ❑ Other

Q13.1 My age group:

- ❍ 20 - 29
- ❍ 30 - 39
- ❍ 40 - 49
- ❍ 50 - 59
- ❍ 60 - 69
- ❍ 70 +

Q13.2 My gender identity:

- ❍ Male
- ❍ Female
- ❍ Prefer not to say

Q13.3 My highest level of education completed:

- ❍ Bachelor's degree
- ❍ Master's degree
- ❍ +30 or Specialist's degree
- ❍ Doctoral degree

APPENDIX D

DESCRIPTIVE STATISTICS

Table D.1 Demographic Characteristics of Survey Participants (*N* = 158)

Characteristic	N	%
Cumulative years as a teacher		
1 - 4 years	19	11.9
5 – 10 years	34	21.4
11 - 20 years	55	34.6
21 + years	46	28.9
No response	5	3.1
Gender identity		
Male	46	28.9
Female	108	67.9
Prefer not to say	5	3.1
Age group		
20 - 29	20	12.6
30 - 39	47	29.6
40 - 49	46	28.9
50 - 59	28	17.6
60 - 69	12	7.5
70 + years old	1	.6
No response	4	3.1
Highest level of educational attainment		
Bachelor's degree	34	21.4
Master's degree	56	35.2
Specialist's degree or +30 hours	57	35.8
Doctorate	9	5.7
No response	2	1.9
Subject taught, if only one		
Mathematics	35	22
English	22	13.8
Social Studies	8	5
Science	23	4.5
Social Sciences	4	2.5
World Languages	10	6.3
P.E. / Wellness	4	2.5
Business	4	2.5
Other	31	19.5
No response	17	11.3

Table D.2 Descriptive Statistics of RQ1

Descriptive Statistics RQ1

	N	Minimum	Maximum	Mean	Std. Deviation
Stage of Adoption	158	1	6	4.17	1.613
Impact of Tech on Teaching Student Centered	158	1	5	3.89	1.007
Impact of Tech on Teaching Routine Use	158	1	5	3.48	1.344
Impact of Tech on Teaching is Positive	158	1	5	3.76	1.006
Impact of Tech on teaching Increases Student Collaboration	158	1	5	3.83	1.113
Impact of Tech on Students Impacts Collaboration	157	1	5	3.54	1.065
Impact of Tech on Students is Positive	157	1	5	3.78	1.034
Impact of Tech on Students Improved Work Quality	157	1	5	3.46	1.107
Tech is USEFUL as a teaching tool	158	1	5	4.23	.897
Valid N (listwise)	157				

Table D.3 Descriptive Statistics of RQ2

Descriptive Statistics RQ2

	N	Minimum	Maximum	Mean	Std. Deviation
Stage of Adoption	158	1	6	4.17	1.613
Impact of Tech on Students Capable to Use	157	1	5	4.08	.874
Tech is EASY to USE as a teaching tool	158	1	5	3.93	1.077
Technical Support Machines in Working Condition	158	1	5	4.28	.805
Technical Support Questions Get Answered	158	1	5	4.22	.905
Technical Support Sufficient Resources for Teachers	158	1	5	4.20	1.025
Technical Support Sufficient Resources for Students like Printers and Software	158	1	5	3.72	1.194
Teacher Readiness Sufficiently Knowledgeable	158	1	5	4.03	.960
Teacher Readiness Tech Alignment with Standards	158	1	5	4.14	.863
Teacher Readiness to Use Tech Sufficient Training	158	1	5	3.75	1.140
Teacher Readiness: Adequate Skills to Teach	158	1	5	4.27	.833
Valid N (listwise)	157				

Table D.4 Descriptive Statistics of RQ3

Descriptive Statistics RQ3

	N	Minimum	Maximum	Mean	Std. Deviation
Stage of Adoption	158	1	6	4.17	1.613
Overall Support from Caregivers	158	1	5	3.80	.865
Overall Support from Community	158	1	5	3.94	.886
Overall Support Tech Plan	158	1	5	3.99	1.062
Overall Support from Teachers	158	1	5	4.02	.841
Overall Support from Administrators	158	1	5	4.04	.967
Valid N (listwise)	158				

Table D.5 Descriptive Statistics of RQ4

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Cumulative Years as Teacher	154	2	5	3.83	.995
Amount of Experiencing Tech as Student	158	1	5	2.30	1.285
Teachers' Age	154	1	6	2.79	1.159
Teachers' Gender	154	1	2	1.70	.459
Teachers' Highest Educational Attainment	156	1	4	2.26	.866
Valid N (listwise)	149				

APPENDIX E

TABLE OF CORRELATIONS

Table E.1 Correlations: Stage of Adoption with Variables

Correlations		
		Stage of Adoption
Stage of Adoption	Pearson Correlation	1
	Sig. (2-tailed)	
	N	158
Cumulative Years as Teacher	Pearson Correlation	-0.110
	Sig. (2-tailed)	0.175
	N	154
Amount of Experiencing Tech as Student	Pearson Correlation	.313**
	Sig. (2-tailed)	0.000
	N	158
Impact of Tech on Teaching Student Centered	Pearson Correlation	.474**
	Sig. (2-tailed)	0.000
	N	158
Impact of Tech on teaching Routinely Use It	Pearson Correlation	0.141
	Sig. (2-tailed)	0.077
	N	158
Impact of Tech on Teaching is Positive	Pearson Correlation	.638**
	Sig. (2-tailed)	0.000
	N	158
Impact of Tech on teaching Increases Student Collaboration	Pearson Correlation	.439**
	Sig. (2-tailed)	0.000
	N	158
Impact of Tech on Students Impacts Collaboration	Pearson Correlation	.393**
	Sig. (2-tailed)	0.000
	N	157
Impact of Tech on Students is Positive	Pearson Correlation	.551**
	Sig. (2-tailed)	0.000
	N	157
Impact of Tech on Students Capable to Use	Pearson Correlation	.362**
	Sig. (2-tailed)	0.000
	N	157
Impact of Tech on Students Improved Work Quality	Pearson Correlation	.370**
	Sig. (2-tailed)	0.000

	N	157
Teacher Readiness Sufficiently Knowledgeable	Pearson Correlation	.580**
	Sig. (2-tailed)	0.000
	N	158
Teacher Readiness Tech Alignment with Standards	Pearson Correlation	.504**
	Sig. (2-tailed)	0.000
	N	158
Teacher Readiness to Use Tech Sufficient Training	Pearson Correlation	.450**
	Sig. (2-tailed)	0.000
	N	158
Teacher Readiness with Tech Adequate Skills to Teach Using It	Pearson Correlation	.473**
	Sig. (2-tailed)	0.000
	N	158
Overall Support from Caregivers	Pearson Correlation	.267**
	Sig. (2-tailed)	0.001
	N	158
Overall Support from Community	Pearson Correlation	.253**
	Sig. (2-tailed)	0.001
	N	158
Overall Support Tech Plan	Pearson Correlation	.276**
	Sig. (2-tailed)	0.000
	N	158
Overall Support from Teachers	Pearson Correlation	.209**
	Sig. (2-tailed)	0.008
	N	158
Overall Support from Administrators	Pearson Correlation	.208**
	Sig. (2-tailed)	0.009
	N	158
Technical Support Machines in Working Condition	Pearson Correlation	0.130
	Sig. (2-tailed)	0.104
	N	158
Technical Support Questions Get Answered	Pearson Correlation	.324**
	Sig. (2-tailed)	0.000
	N	158
Technical Support Sufficient Resources for Teachers	Pearson Correlation	.326**
	Sig. (2-tailed)	0.000

	N	158
Technical Support Sufficient Resources for Students like Printers and Software	Pearson Correlation	.237**
	Sig. (2-tailed)	0.003
	N	158
Tech is USEFUL as a teaching tool	Pearson Correlation	.404**
	Sig. (2-tailed)	0.000
	N	158
Tech is EASY to USE as a teaching tool	Pearson Correlation	.590**
	Sig. (2-tailed)	0.000
	N	158
Frequency of tech use weekly	Pearson Correlation	.757**
	Sig. (2-tailed)	0.000
	N	155
Frequency of tech use during class period	Pearson Correlation	.563**
	Sig. (2-tailed)	0.000
	N	157
Teachers' Age	Pearson Correlation	-0.127
	Sig. (2-tailed)	0.117
	N	154
Teachers' Gender	Pearson Correlation	0.132
	Sig. (2-tailed)	0.102
	N	154
Teachers' Highest Educational Attainment	Pearson Correlation	-0.048
	Sig. (2-tailed)	0.555
	N	156
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

APPENDIX F

SPSS OUTPUT FOR ANALYSIS OF DATA RELATED TO RESEARCH QUESTIONS

Table F.1 SPSS Output for Research Question 1

RQ1 Model Summary

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate
RQ1	.674[a]	.454	.424	1.228

ANOVA[a]

Model RQ1		Sum of Squares	df	Mean Square	F	Sig.
RQ1	Regression	185.328	8	23.166	15.373	.000[b]
	Residual	223.029	148	1.507		
	Total	408.357	156			

Dependent Variable: Stage of Adoption

Predictors: (Constant), Tech is USEFUL as a teaching tool, Impact of Tech on teaching Routinely Use It, Impact of Tech on Teaching Student Centered, Impact of Tech on Students Improved Work Quality, Impact of Tech on Students is Positive, Impact of Tech on Students Impacts Collaboration, Impact of Tech on Teaching is Positive, Impact of Tech on teaching Increases Student Collaboration

Table F.2 SPSS Output for Research Question 2

RQ 2 Model Summary

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate
RQ2	.711[a]	.506	.472	1.176

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
RQ2	Regression	206.552	10	20.655	14.943	.000[b]
	Residual	201.805	146	1.382		
	Total	408.357	156			

a. **Dependent Variable**: Stage of Adoption

b. **Predictors:** (Constant), Tech is EASY to USE as a teaching tool, Technical Support Sufficient Resources for Students like Printers and Software, Technical Support Machines in Working Condition, Impact of Tech on Students Capable to Use, Teacher Readiness with Tech Adequate Skills to Teach Using It, Technical Support Questions Get Answered, Teacher Readiness Tech Alignment with Standards, Teacher Readiness to Use Tech Sufficient Training, Technical Support Sufficient Resources for Teachers, Teacher Readiness Sufficiently Knowledgeable

Table F.3 SPSS Output for Research Question 3

RQ3 Model Summary

Model RQ3	*R*	R^2	Adjusted R^2	Std. Error of the Estimate
	.303[a]	.092	.062	1.562

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
RQ3	Regression	37.471	5	7.494	3.071	.011[b]
	Residual	370.915	152	2.440		
	Total	408.386	157			

a. **Dependent Variable:** Stage of Adoption

b. **Predictors:** (Constant), Overall Support from Administrators, Overall Support from Teachers, Overall Support from Community, Overall Support through Technology Department Plan, Overall Support from Caregivers

Table F.4 SPSS Output for Research Question 4

RQ4 Model Summary

Model RQ4	R	R^2	Adjusted R^2	Std. Error of the Estimate
	.370[a]	.137	.088	1.582

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
RQ4	Regression	49.192	7	7.027	2.808	.010[b]
	Residual	310.286	124	2.502		
	Total	359.477	131			

Dependent Variable: Stage of Adoption

Predictors: (Constant), Multiple Course Levels Taught, Amount of Experiencing Tech as Student, One Subject Taught, Teachers' Age, Teachers' Gender, Teachers' Highest Educational Attainment, Cumulative Years as Teacher

VITA

Koye Cashion Solomon, a native of Giles County, Tennessee, attended public school and graduated as her high school class's salutatorian. Koye earned an Associate of Science degree from Columbia State Community College before beginning studies at Middle Tennessee State University (MTSU). Koye earned a Bachelor of Science degree from the MTSU Liberal Arts College, majoring in English and minoring in Psychology and Business Administration. After working as an assistant comptroller at Hillside Hospital in Pulaski, Tennessee, Koye returned to MTSU to complete coursework needed for teacher licensure. Koye then taught freshman English at Coffee County Junior High School and attended MTSU to earn a Master of Education degree in Administration and Supervision. Koye completed classes at Tennessee Technological University to earn credentials to teach elementary grades K-8. Koye served as Media Specialist for Lynchburg Elementary School in Lynchburg, Tennessee, for a decade before taking a brief sabbatical to open a family business. Having demonstrated leadership in school library automation efforts, Koye was actively recruited to be the Media Specialist at West Middle School in Tullahoma, Tennessee, where she served for 10 years. Koye continued her education at the University of Tennessee at Chattanooga when she was accepted into the Learning and Leadership Doctoral Program in 2013. Koye transferred to a new teaching assignment at Tullahoma High School, where she currently is an instructor for junior and senior level English courses.