THE EFFECT OF TECHNOLOGY SELF-EFFICACY AND PERSONAL ENGAGEMENT ON STUDENTS' AND TEACHERS' ATTITUDES TOWARD TECHNOLOGY USE IN EDUCATION

A Dissertation
by
MELANIE ELLEN MIKUSA

Submitted to the Graduate School
at Appalachian State University
in partial fulfillment of the requirements for the degree of
DOCTOR OF EDUCATION

August 2015
Educational Leadership Doctoral Program
Reich College of Education

THE EFFECT OF TECHNOLOGY SELF-EFFICACY AND PERSONAL ENGAGEMENT ON STUDENTS' AND TEACHERS' ATTITUDES TOWARD TECHNOLOGY USE IN EDUCATION

A Dissertation
by
MELANIE ELLEN MIKUSA
August 2015

APPROVED BY:

Sara Olin Zimmerman, Ph.D.
Chairperson, Dissertation Committee

Barbara B. Howard, Ed.D.
Member, Dissertation Committee

Patrick M. O'Shea, Ph.D.
Member, Dissertation Committee

Vachel Miller, Ed.D
Interim Director, Educational Leadership Doctoral Program

Max C. Poole, Ph.D.
Dean, Cratis D. Williams School of Graduate Studies

Abstract

THE EFFECT OF TECHNOLOGY SELF-EFFICACY AND PERSONAL ENGAGEMENT ON STUDENTS' AND TEACHERS' ATTITUDES TOWARD TECHNOLOGY USE IN EDUCATION

Melanie Ellen Mikusa
B.A., The Ohio State University
M.A., Appalachian State University
Ed.D., Appalachian State University

Dissertation Committee Chairperson: Sara Olin Zimmerman, Ph.D.

A shifting educational landscape brought an influx of technology into K-12 education. Preparing students for entry into a global workforce led many school systems to mandate the integration of technology into daily instruction. The explanatory sequential mixed method design of this study investigated teachers' and students' technology self-efficacy and attitudes toward technology usage as they affect technology implementation in the classroom. Although previous studies addressed teacher beliefs, attitudes, and barriers to technology use, the inclusion of students' views within this study added a dimension missing from the earlier literature. Venkatesh, Morris, Davis, and Davis' (2003) Unified Theory of Acceptance and Use of Technology was used as the underlying conceptual framework for this study along with four key constructs predictive of technology usage complied by Gu, Zhu, and Guo (2013). The merged model incorporated technology self-efficacy and attitudes toward use as measures

affecting integrated technology in education. Through student and teacher focus groups, as well as online surveys, participants indicated high engagement with technology for personal use. Additionally, both teachers and students identified increased efficiency afforded by the use of technology for instructional purposes. This study also showed that despite students' high technology self-efficacy and positive attitude towards its use, teachers are frequently the gatekeepers of technology engagement in the classroom. As a result, current technology use is dictated by teachers' technology self-efficacy and knowledge of technology integration within the curriculum. The implications coming out of this study center on the need for curricular redesign and professional development needed to support an emerging pedagogical shift.

Acknowledgments

Simple words fall short of my appreciation for my dissertation chair, Dr. Sara Zimmerman. Your belief in me has made this journey possible. You have been my mentor, my coach, and my collaborator. Thank you for your kindness, your guidance, and your unending support. I would also like to thank Dr. Barbara Howard. Your methodological guidance strengthened this study and increased my research skills. Thank you, Dr. Patrick O'Shea, for your insights on current issues within the field of educational technology.

I would also like to thank my daughter, Flannery Mikusa. Your diligent proofreading throughout my coursework made writing multiple iterations enjoyable. My writing journey would not be complete without the editing support of my dear friend Jane Cantwell. Thank you for your countless hours of reading and attention to detail.

Thank you, Cohort 20 and our fantastic writing group, for sharing this experience with me. I will always cherish our collegiality. Together we have accomplished something great.

And lastly, I would like to thank my loving husband Ed Mikusa for his continual encouragement and unconditional love. Knowing that you were by my side has made all the difference.

Dedication

To my loving husband Ed and my extraordinary daughter Flannery

Table of Contents

List of Tables

List of Figures

Chapter One

Introduction

Technology use is ubiquitous in today's K-12 schools. According to Fletcher (2006), students of all ages interact with instructional technology daily within the classroom. Students use personal computers, hand-held electronic tablets, the Internet, and other technologies to research, create, collaborate, communicate, and acquire critical thinking skills. These 21st century competences are all necessary for entry into the workforce (Spires, Lee, & Turner, 2008).

The availability and accessibility of technology along with the 21st century skills that often accompany technology use have led many school systems and administrators to mandate technology integration in classrooms with students of all ages (Fletcher, 2006). The U.S. Department of Education's 2010 National Education Technology Plan (NETP) outlines bringing "state-of-the art technology into learning to enable, motivate, and inspire all students, regardless of background, languages, or disabilities, to achieve. It leverages the power of technology to provide personalized learning and to enable continuous and lifelong learning" (p. x). One goal of the NETP is to ensure that all students and teachers have ongoing and individual access to hardware, software, and the Internet to engage in meaningful learning in 21st century teaching modes (U.S. Department of Education, 2010). The implementation of technology integration initiatives such as one-to-one computer access, bring your own device policies, use of mobile devices for e-learning supported by campus-wide wireless access, and online distance learning refutes Prensky's (2001) earlier assertion that, pedagogically, schools have not moved out of the 20th century. Teachers and school leaders are working to

integrate technology in ways that may enhance student learning and ultimately impact student outcomes. Is this a pedagogical shift toward greater constructivist principles, where knowledge is not passively accumulated, rather than the result of the popularity of technology? Perhaps, however, it is just an attempt to employ new instructional tools based on a set of distinct characteristics of students labeled as "digital natives" and members of the "net generation."

Prensky's (2001) term digital native describes students, born after 1980, who have grown up in a digital age with videogames, computers, mobile phones, digital music players, and instant access to information through the Internet. The continual interface comes to define them, as technology is an integral part of their lives. Prensky and others suggest that digital natives possess an innate knowledge of how to interact with technology (Prensky, 2001; Rosen, 2010; Tapscott, 2008). Additionally, due to the ubiquity and continual exposure to technology, digital natives process information differently than previous generations of students, and as a result, it is imperative for educational experiences to change (Prensky, 2001; Rosen, 2010; Tapscott, 2008). Rideout, Foehr, and Roberts (2010) claim the media saturation during formative years in students' brain development dramatically increased from 1999 to 2009. This technology use and inundation has affected students' approaches to learning (Prensky, 2001; Rosen, 2010; Tapscott, 2008).

Oblinger and Oblinger (2005) identify current college students as the net generation due to the fact they have never known life without the Internet. The omnipresence of information technology interwoven throughout students' lives has made technology second nature (Oblinger & Oblinger, 2005). Although the data indicating

access to and high usage of technology among students have dramatically increased (Rideout et al., 2010), limited empirical data exist to demonstrate the value in making information technology an integral part of education for the net generation. Even in the absence of such data there continues to be an outcry for educational reform based on the digital native/immigrant, net generation premise, as defined by Prensky (2001), Tapscott (1998), and Oblinger and Oblinger (2005). While policy makers may see technology use in education as a cure-all for the decline in the current U.S. educational system, educators must first define learning goals before adding the proper technology tools to meet students' educational needs (Brenneman, 2014).

Statement of the Problem

As part of the Obama administration, the U.S. Department of Education's competitive grant, Race to the Top, encourages and financially rewards individual states for creating innovative educational initiatives. Race to the Top has provided over four billion dollars to many of the nation's educational systems (United States Department of Education [USDE], 2009). Although federal money and public sentiment continue to drive technology into schools, teachers' knowledge of how to implement technology in meaningful ways and the understanding of student motivations to engage technology for personal use have not kept pace, hampering technology integration in many classrooms (Russell, Bebell, & O'Dwyer, 2005). Data from the National Center for Education Statistics (NCES) show that the majority of teacher education programs indicate providing instruction in the use of educational technology to preservice teachers in order to enhance and enrich student learning (Kleiner, Thomas, & Lewis, 2007). This denotes an incongruity with the NCES 2000 study on teachers' perceptions of self-efficacy in

regards to technology integration. At that time, only 23% of 1,674 surveyed teachers felt prepared to include technology in their instruction (Inan & Lowther, 2010). This would indicate that although teacher preparation programs are preparing initially licensed teachers to implement educational technology, teacher self-efficacy influences daily technology integration.

Barriers continue to exist between meaningful educational technology integration and authentic daily use of technology (Kleiner et al., 2007). To harness the power of information technology to enhance classroom instruction and ultimately increase student learning outcomes, it will be necessary to examine the role technology self-efficacy and attitude toward technology use play in driving student and teacher personal use of technology to cross over into the educational setting. This study investigates the gap between meaningful personal use of technology and its integration into classroom instruction.

Teacher Self-efficacy

Education in the 21st century has experienced a seismic pedagogical shift. In part, this shift results from the technological boom that has taken place on a global scale over the last decade. Technology is pervasive in K-12 education with the infusion of hardware, software, and Internet connectivity available to both teachers and students (Rideout et al., 2010). Along with this unprecedented infusion of technology, the role of the teacher is shifting from the imparter of knowledge to the facilitator of knowledge (Padmavathi, 2013). Administrators, parents, and students expect teachers to integrate new technologies into lessons to support 21st century student learning and thinking skills such as critical thinking, problem solving, communication, and collaboration (The Partnership

for 21st Century Skills, n.d.). However, for meaningful student outcomes to occur, the Partnership for 21st Century Schools (n.d.) states, "standards, assessments, curriculum, instruction, professional development and learning environments must be aligned" (The Partnership for 21st Century Skills).

Although many of today's students have grown up in a world full of technology as digital natives, many of our country's current teachers have not. In 2011, only 21% of teachers in United States public schools were 29 years old or younger with 79% being 30 years or older (Feistritzer, 2011). According to Prensky (2001), these teachers are digital immigrants, frequently having to play catch up in skills and knowledge acquisition. "Often teachers perceive they cannot act as authority figures in their classrooms if they bring in tech tools" (Hammonds, Matherson, Wilson, & Wright, 2013, p. 36).

As designers of curriculum, teachers set the stage for technology use. "Teachers' attitude is considered as one of the important reasons for avoiding use of technology in the classroom" (Padmavathi, 2013, p. 5). Research indicates these technology value beliefs and barriers to utilizing technology in the classroom may stem from the folk pedagogies that many teachers hold. For example, the cultural belief of teacher as authority may cause teachers to struggle when trying to introduce a new technology if they themselves do not completely understand its use and cannot act as the authority (Bruner, 1996). "Folk pedagogies are informed by folk beliefs about the nature of knowledge (folk epistemologies) and how people learn (folk learning theories)" (Belland, 2009, p. 355). Although, typically teachers embrace the distinct learning theories they are exposed to in pre-service education, often they act based on their folk beliefs (Belland, 2009). These folk pedagogies can act as a barrier to technology integration as the

educators are often unaware that they act on these beliefs (Belland, 2009; Hammonds, Matherson, Wilson, & Wright, 2013).

Beliefs are often adopted through a process of enculturation and social construction (Pajares, 1992). This may include incidental learning, informal education, and formal education. Over time, beliefs are fostered, becoming enduring, unalterable, and highly resistant to change. Pajares (1992) states, "the earlier a belief is incorporated into the belief structure, the more difficulty it is to alter, for these beliefs subsequently affect perception and strongly influence the processing of new information" (p. 317). It is likely that the majority of current teachers did not experience integrated technology in their early schooling and consequently practice nontechnology instructional techniques that were successful for them as students.

One lens for understanding teachers' practices is Bourdieu's theory of *habitus* that states lived conditions influence one's habitus. Webb, Schirato, and Danaher (2002) describe "the habitus is the set of durable dispositions that people carry within them that shapes their attitudes, behaviours and responses to given situations" (p. 114). Teachers have all experienced some form of K-12 education as well as undergraduate education. These educational experiences become part of the habitus or teaching beliefs teachers bring with them into the classroom. As many teachers were educated without the use of integrated technology, it is not part of their habitus and not part of their folk pedagogy. Additional studies attribute barriers to technology integration to the following factors: demographic characteristics of teachers, availability of resources, little to no professional development, and lack of teachers' personal technology skills (Inan & Lowther, 2010).

In today's 21st century classrooms, it is expected that teachers use technology to enhance student engagement, create collaborative learning environments, and provide students opportunities for higher order thinking. Although many teachers are entering the classroom with some technology skills for personal use, they do not have a comprehensive understanding of the application of technology for instructional use (Hammonds et al., 2013). Teachers often face limited or antiquated technology resources and in some schools, they must also vie for limited technology lab time. This lack of time coupled with the lack of resources further exacerbates the lack of teacher self-efficacy (Hammonds et al., 2013). These first-order or school-level barriers are interrelated with second-order also referred to as teacher-level barriers of personal self-confidence, academic self-efficacy, and technical competence. Together, these obstacles can often lead to a lack of technology integration that can then result in non-utilization of technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2013; Padmavathi, 2013). To overcome the barriers to technology integration, educators and administrators must work together to identify and understand the interrelationship of school-level and teacher-level barriers (Padmavathi, 2013).

Motivation to Use Technology

Technology has infiltrated every facet of daily life. In 2014, Pew Research Internet Project survey on mobile technology reported 90% of Americans have a cell phone with 58% of cell phones identified as Smartphones. Additionally, 42% of respondents claim to own a tablet computer. The use of mobile technology for academic purposes is also on the rise. Pew researchers surveying Advanced Placement teachers in 2013 stated that 73% of the instructors have used or allowed students to use mobile

phones for school assignments. Additionally, studies indicated mobile devices are being utilized to complete assignments outside of class (Purcell, Heaps, Buchanan, & Friedrich, 2013). Due to this increased availability of mobile devices, technology-mediated instruction is potentially an excellent strategy to enhance and improve learning.

Although students are motivated to utilize technology for personal benefit (Lee, Cheung, & Chen, 2005; Rosen, 2010), currently there is a gap in the literature regarding student motivation for utilizing technology for academic purposes. Motivation is critical to students' engagement in any learning activity; the degree of attainment may be influenced by their motivation (Ciampa, 2014; Malone & Lepper, 1987). Davis' (1989) Technology Acceptance Model (TAM) described adoption and usage from an extrinsic motivational perspective, focusing on influences such as ease of use and usefulness. Expanding the TAM model to include the intrinsic motivator of perceived enjoyment, Lee, Cheung, and Chen (2005) identified perceived usefulness and perceived enjoyment as critical factors to the adoption and use of technology-mediated learning. Furthermore, with the accessibility and intuitive nature of technology, ease of use is no longer a factor in students' attitude toward use (Lee, Cheung, & Chen, 2005).

Stemming from previous theoretical models focusing on acceptance and usage of technology in both psychology and sociology, the Unified Theory of Acceptance and Use of Technology (UTAUT) merges critical factors and predictive behavioral intentions to use a technology (Venkatesh, Morris, Davis, & Davis, 2003). Creating a baseline model for future studies, the UTAUT has been applied in a variety of extension models examining new technologies, new users, and new settings (Venkatesh, Thong, & Xu, 2012). Similarly, Gu, Zhu, and Guo (2013) reviewed multiple studies examining

motivating factors for the acceptance and use of technology for educational purposes. The outcome of the study yielded four key predictive constructs comparable in nature to those of the UTAUT. The lens of Gu, Zhu, and Guo, as well as the UTAUT, is utilized throughout the study to understand teachers' and students' acceptance and use of technology in education. This study attempts to extend the UTAUT through the introduction of technology self-efficacy and attitudes toward using technology as factors that influence the acceptance and use of technology in education.

Purpose Statement of Research

It is inherently dangerous to make sweeping educational reforms based solely on anecdotal accounts and gross generalizations intended to represent an entire generation. Although technology ownership has increased dramatically, equal access to digital devices does not exist (Rideout et al., 2010). Due to this lack of access, many low-income and rural students are as unequipped to use technology as Prensky's digital immigrants (Lenhart, Arafeh, Smith, & MacGill, 2008). Working under the digital native assumption potentially leads educators to teach as if all students possess strong technology skills, creating a greater divide between students with and without such skills (Bennett, Maton, & Kervin, 2008). This research moves the discussion beyond the binary concept of digital native and immigrant. A greater understanding of how teachers and students currently employ technology in their everyday lives and what motivates its use will be necessary in order for technology to be integrated in a meaningful manner and enhance educational outcomes. The purpose of this study is to examine the influence of technology self-efficacy and attitudes toward technology use on students' and teachers' external use and in-class technology practices.

The basic concept underlying individual user acceptance models identifies the interaction between attitudes toward using technology, intention to use, and actual use (Vankatesh et al., 2003). To harness the power of technology-mediated learning to enrich classroom instruction, it is important to examine this interaction through accessing personal technology usage and technology self-efficacy along with its role in driving student and teacher use of technology inside the classroom.

The following research questions guided this study.

- To what degree do students' and teachers' technology self-efficacy and personal technology usage affect the use of technology for educational purposes?
- What are students' perceptions of specific technological practices used in the classroom?
- What technology tools (both hardware and web tools) do students and teachers use and how frequently do they use them?
- How does personal technology use correlate with educational technology use?

Methodology

A mixed methods research design was used to examine the idea that for integrated technology to be employed meaningfully in instruction and ultimately enhance educational outcomes in K-12 learning environments, a greater understanding of how teachers and students employ technology in their everyday lives and the motivation for its use is necessary. To explore the crossover of personal motivations for technology use into the academic setting, quantitative survey data preceded focus group interviews to explain and explore the survey data. The study was comprised of student and teacher quantitative survey data and qualitative focus group interviews from a high school and two middle

schools in a rural mountain community. The school district consists of one high school, two middle schools, and five elementary schools, serving 2,130 students. The school district self-identifies as a 21st century district and recently initiated a one-to-one laptop initiative, assigning laptops to all high school students and equipping all elementary classrooms with enough iPads for one-to-one use.

Significance of Issue

Educators, students, and curriculum designers find themselves in complex times where technology in relation to schooling is concerned (Blair, 2012; Thomas & Brown, 2011). Questions surrounding which technologies serve students best are the focus of many research efforts, while other researchers continue to examine teachers' perspectives and the barriers for technology use in the classroom (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Gorder, 2008; Hammonds et al., 2013; Liu & Huang, 2005). However, less focus has been placed on understanding the connection between students' motivation for personal technology use and their perceptions of the value of technology for educational purposes. In the absence of a detailed set of empirical explanations for the student/technology/instruction nexus, still other researchers are swift to generalize about the nature of the digital learner (Prensky, 2001; Rosen, 2010; Tapscott, 2008).

Terms such as Prensky's (2001) digital native and Tapscott's (1998) net generation are ascribed to the digital learner, referring to the same set of attributes. Digital natives are part of the net generation. Tapscott (1998) describes net generation students as curious, self-reliant, assertive, fiercely independent, innovative, and with a need for immediacy. "Because they have the tools to question, challenge, and disagree, these kids are becoming a generation of critical thinkers" (Tapscott, 1998, p. 88).

Furthering this assertion, Rosen (2010) argues, " technologically adapted curriculum materials have been proven to help students develop higher-order thinking skills" (p. 201). Over the past decade, Prensky's (2001) dichotomous concept of the digital native/digital immigrant has gained popularity with educators. Students are native to the digital world whereas educators who were not raised in the digital culture but are fascinated by or are forced to engage with technology are referred to as immigrants. The use of the linguistic analogy to describe differences between teacher and learner is easily understandable and readily accepted. However, this linguistic binary is problematic for the future of education because, according to Prensky (2001), "the single biggest problem facing education today is that our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language" (p. 2).

The rush to adopt and adapt to this new digital learner is based on insufficiently researched assumptions (Kennedy, Judd, Dalgarnot & Waycott, 2010). Limited empirical evidence now challenges these assumptions. Bennett, Maton, and Kervin (2008) posit,

> Though limited in scope and focus, the research evidence to date indicates that a proportion of young people are highly adept with technology and rely on it for a range of information gathering and communication activities. However, there also appears to be a significant proportion of young people who do not have the levels of access or technology skills predicted by proponents of the digital native idea. Such generalizations about a whole generation of young people thereby focus attention on technically adept students. With this comes the danger that those less interested and less able will be neglected, and that the potential impact of socio-

> economic and cultural factors will be overlooked. It may be that there is as much variation *within* the digital native generation as *between* the generations. (p. 778)

Educators must consider all factors affecting students when creating educational opportunities. This study creates a nuanced understanding of students' and teachers' attitudes toward technology use, and the crossover into education by constructing a multidimensional portrait to better match the more complex times.

Definition of Terms

Apps – programs for computers or mobile devices that support student learning and/or connection to the Internet

Authentic learning – open-ended inquiry often situated around real-world problems, typically involving work beyond the classroom

Bring Your Own Device (BYOD) – a policy implemented in schools that allows students to bring technology devices from home for academic purposes

Digital learners – students who engage with technology for educational purposes

e-learning – the use of technology to enhance students' educational experiences

Googling – the use of search engines to find information on the Internet

Integrated technology – the use of technology, Internet, or other media for academic purposes

Mobile devices – any technology that is moveable, yet connected to the Internet

Motivation – external and internal factors driving technology engagement

On-line distance learning – courses offered online for students unable to attend classes on campus due to time or distance

One-to-one computing– one computer for each user in a classroom setting

Personal factors –self-reported frequency of use, attitudinal beliefs about technology

Technology self-efficacy – personal belief in one's ability to successfully use technology to increase learning outcomes

Web 2.0 – cloud-based applications used for the acquisition and creation of knowledge

- Definitions generally accepted in educational settings, see appendix G for cited definitions of constructs utilized in this study.

Organization of Study

Chapter one provides important background information relevant to this research topic. This foundation introduces the context in which this research study is situated. Chapter two provides an examination of pertinent research and explores current literature regarding general motivation theory to accept and use technology, teacher self-efficacy in teaching with technology, student motivation to engage with technology, and student perception of value of technology pedagogy. Additionally, chapter two includes a review of the theoretical framework used in this study. Chapter three outlines the methodologies utilized by the researcher in this study, describing participant selection, data collection methods, and analytics employed. Chapter four provides the results in a mixed method format; data are triangulated for greater validity. Finally, chapter five offers an analysis of the study results, drawing conclusions, stating implications and limitations of the study as well as suggestions for future research.

Chapter Two

Review of the Literature

In order to establish the perimeter of this scholarly exploration, several categories of literature are considered. The purpose of this chapter is to build a foundational understanding relating to factors influencing technology use in K-12 classrooms with an emphasis on teachers' and students' motivation to engage with technology for educational purposes. The review includes four sections. Section one explores the digital native/digital immigrant binary as a descriptor for technology users and the characteristics ascribed to digital learners. Section two addresses technology use and acceptance while section three looks at motivation and its connection to the acceptance and use of technology for personal and academic activities. Section four moves into teacher self-efficacy with regard to integrated technology.

Technology plays a large role in the life of today's students (Bennett, 2012; Kennedy et al., 2010). Claims of innate technology knowledge in digital learners and calls for broad sweeping reform of curriculum may "lead instructors to make unsupported assumptions about their students' mastery of educational technology and therefore neglect to teach students the skills they need for academic success" (Thompson, 2013, p. 13). Therefore, it is imperative to consider the relationship between personal technology engagements and attitudes toward the use of technology for educational purposes when making curricular decisions. With unprecedented access to and use of the Internet - 93% of teens report access to the Internet at home with 74% using cell access (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013) - understanding how to leverage students'

motivation for personal technology use in education could create a richer learning environment, potentially opening the door to innovation and discovery.

Digital Native and Digital Immigrant

The digital nature of society has created a new type of student (Prensky, 2001; Tapscott, 1998). Prensky (2001) suggests 21st century students are different from previous generations of students due to their total immersion in a digital culture. Surrounded by video games, cell phones, computers, the Internet, and other technologies, these students "think and process information fundamentally differently from their predecessors" and are "native speakers" of the digital language (Prensky, 2001). Coining the term "digital native," Prensky attributes the native status and characteristics to the generation born between 1980 and 1994 into this digital world.

Tapscott (1998) uses the term "net generation" or "net-gen" to identify children who in 1999 were between the ages of two and twenty-two. Similar to digital natives, the net-gen is fluent in digital technologies and has a distinct set of personal characteristics and learning needs that include a preference for multi-tasking, nonlinear thinking, a social aspect to learning, speed, and an inability to tolerate slow-paced environment (Prensky, 2001; Rosen, 2010; Tapscott, 2008; Thompson, 2013). Technology has become an extension of the students so much so that they do not see the devices as technology but as an essential part of everyday life (Bennett, 2012; Prensky 2001). From 1984 to 2012 households reporting having a computer at home increased 70.7% from 8.2% to 78.9% (U.S. Census Bureau, 2012) illustrating both the essential nature and increased access of technology. More recently, the Pew Research Internet Project (2014) shows 66% of Americans would feel lost without their cell phones. Many of these phones are

Smartphones, equipped with Internet browsers, cameras, voice recognition, keyboards, graphics, and functionality similar to computers. These features have potential to enhance student learning and increase student engagement (Prensky, 2001). Additionally, Hedberg (2011) believes the use of technology has the capability to act as a *disruptive innovation* and change the educational process:

> These combinations of innovations and technologies enable alternative ways of learning about the world that no longer require the industrial organization of the classroom wherein learning and teaching activities and processes are achieved through the teacher-centric control of pedagogy, knowledge and technologies. (Hedberg, 2011, p.2)

The idea of alternative ways of learning raises the question: Are today's educators prepared to adopt these educational changes?

Prensky (2001) identifies many of today's educators as digital immigrants who were born before the digital world but who have adapted and adopted many facets of technology. However, Prensky (2001) also speculates that teachers, as digital immigrants, retain much of their pre-digital mindset rendering traditional in-service training useless.

The concept of variation within and between the digital native and the digital immigrant generation emphasizes the complexity of the utilization of technology to enhance educational outcomes. Kennedy, Judd, Dalgarnot, and Waycott (2010) question the value of continued efforts to classify users in broad terms and instead point out the value in exploring factors beyond age that may influence the use of technology. Issues of access, gender, socio-economic status, cultural background, and interest are correlated with technology use (Bennett et al., 2008; Kennedy et.al, 2010).

Moving beyond the confines of digital native and immigrant, White and Le Cornu (2011) shift to a continuum ranging from visitor to resident. Unlike the native/immigrant binary, the continuum visitor/resident does not denote either end as having a higher value or greater technical skills. Users are dynamic, moving along and in and out of the continuum, based on needs and goals. White and Le Cornu (2011) use the metaphor of a garden shed and tool. Visitors enter into educational technologies, the shed, with a goal or task in mind. The technology is the tool and once the task is complete, the tool is put back, and the visitor returns to nonuse of technology. The resident sees educational technologies as a place, the garden, where the shed resides. Within this garden, the resident is confident and comfortable moving about, collecting information, and constructing meaning from all interactions. Users take on different roles based on need, knowledge, and comfort. Resident becomes visitor; visitor becomes resident. The shift away from the digital native/immigrant binary to the dynamic interface paradigm may allow for teachers and students alike to move along the continuum in educational settings, interacting with one another as well as the technology tools without bias.

Whether looked at as a digital native or on the resident/visitor continuum, the majority of today's students access some form of technology for personal or educational use on a regular basis (Diemer, Fernandez, & Streepey, 2012). This hyper-connectedness of students is a radical change from previous generations and may require new approaches and practices in education.

Technology Acceptance and Use

One cannot assume there is a direct application of everyday technology skills to educational use (Bennett et al., 2008). Many factors may influence the potential

transference of technology skills from one domain to another. One factor is technology acceptance among users as introduced by Gu, Zhu, and Guo (2013). They define "technology acceptance, as the users' intention and/or the actual usage of technology" (p. 393). Gu, Zhu, and Guo (2013) suggest four constructs as predictors for technology acceptance by the end user, teacher or student: outcome expectancy, task fit, social influence, and personal factors. Outcome expectancy focuses on the attitudes and beliefs of the perceived usefulness and ease of using the technology. Students often look to technology to serve a purpose, for example, using Facebook to connect and maintain relationships with those that have shared interest (Sanchez, Coritjo, & Javed, 2014). Task fit focuses on the degree to which the technology supports task performance. Lee and Lehto (2013) highlight the use of YouTube for learning procedural tasks as an example of task fit. Social influence addresses the belief that use of technology for a given task is the social norm, while personal factors look at the self-efficacy of the individual engaged with technology. "Given that the technology integrated into classroom is designed by teachers for the benefit of students, knowing the difference of technology acceptance among teachers and students could help in the development of classroom technology products that cater to digital natives" (Gu, Zhu, & Guo, 2013, p. 392).

From interacting with friends on Facebook to Googling facts, many students utilize technology every day. A recent Pew Research Internet Project (2014) highlights an overreliance on Internet search engines to obtain needed information for research with 94% of students reporting Google as the first source for information when conducting research. The Pew survey (2014) finds that teachers believe that "search engines have conditioned students to expect to be able to find information quickly and easily" (p. 3).

Additionally, the sheer volume of available information is overwhelming, making identifying credible information more difficult and ultimately "discouraging students from finding and using a wide range of sources" (Purcell, Heaps, Buchanan, & Friedrich, 2013). Although the ease and immediacy of accessing social media and the Internet allows students to quickly and successfully obtain information, it may also preclude students from engaging in serious research and developing critical thinking. However, in direct opposition to the argument that use of the Internet has created lackadaisical students, the Internet has also led to the need for bricolage, piecing together information, (Kolikant, 2010; Turkle & Papert, 1991) in the constructivist manner of knowledge creation. Students must exercise higher order thinking skills to analyze and synthesize this pieced together information.

Technology use does not reside solely in the classroom. Personal use of technology continues to increase. A recent Pew online survey indicates that currently 95% of teens participate in online activities, with 78% using a cell phone, 37% using a smartphone, and 23% using a tablet to connect with social media (Purcell et al., 2013). Acknowledging the prevalence of technology use, many teachers accept the need to integrate technology into the classroom (Purcell et al., 2013). Moving beyond the interactive whiteboard to more one-to-one technology use, teachers design lessons utilizing laptops, desktops, and now mobile devices. Students participate in a variety of technology-related activities, engaging in research as well as accessing and submitting assignments online. According to Purcell, Buchanan, and Friedrich (2013) teachers create interactive online learning activities such as website construction, blogs, and synchronous online discussions using a variety of platforms to facilitate collaboration among students.

Learning activities may need to mimic personal use to meet the needs of the digital learner. According to Lorenzo, Oblinger, and Dziuban (2007), "constantly connected to information and each other, students don't just consume information. They create – and re-create – it" (p. 6). Through collaborative online learning activities, students connect to both the information and each other, in a way that is similar to personal use of social media. Students are accessing and exchanging information both synchronously and asynchronously in a technologically humanistic manner. Working in these online venues creates a social community stemming from multidirectional collaboration, communication, and decentralized authority (Lorenzo et al., 2007). However, Bennett and Maton (2010) point out that "with the exception of social networking, most activities associated with Web 2.0, such as blogs and wiki sites, are engaged by a minority of respondents on large scale surveys" (p. 324).

Although students may not participate in Web 2.0 activities for nonacademic purposes, do their skills and expectations from social networking transfer to academic tasks? Bennett and Maton (2010) question whether everyday technology skills prepare students for academic rigor:

> Writing a blog while travelling abroad may not equip students with the skills they need to use the same technology to develop a reflective journal as part of their studies – the nature of the tasks and the forms taken by the knowledge being constructed are different. (p. 325)

The question then arises, whose knowledge is being constructed? Teachers use preselected scope and sequence documents to guide instruction and expect students to use technology as a vehicle to obtain this knowledge. In informal learning contexts, students'

interest drives their technology use. Educators may need to consider "formal educational contexts and everyday contexts as being different, comprising different activities with different purposes and outcomes, without necessarily privileging one over the other" (Bennett & Maton, 2010, p. 325). Acknowledging both the similarities and differences in technology use and context, then capitalizing on the similarities may create opportunities for technology to enhance educational outcomes.

Many students use technology in everyday life to engage in social networks such as Facebook, Twitter, and Instagram (Madden, Lenhart, Cortesi, Gasser, Duggan, Smith, & Beaton, 2013). Social networking sites provide a sense of community where participants can construct personal profiles within the bounded system; yet, others can access them with permission. Furthermore, individuals can use these sites to connect, communicate, and share information with a large community (Sanchez et al., 2014). Adapting teaching styles and content delivery methods to meet students on these digital platforms has the potential to revolutionize instruction or at the very least redefine best practices in the pedagogy of content delivery and instruction (Hedberg, 2011). The recent development of the Common Core Essential Standards by teams from 48 states, two territories, and the District of Columbia, with a focus on critical thinking may be an attempt to meet these digital learners.

Since most students ultimately see and use technology as a tool in their everyday lives, it seems that simply having technology devices is no longer a motivating factor for student use (Ciampa, 2014). Rather, in order for authentic technology use to occur in the classroom, educators need to leverage students' motivation for personal technology use.

Combining technology-rich classrooms with intrinsically motivated students may have a significant impact on student learning outcomes.

Motivation to Engage Technology

Extensive research exists on motivational theory (Brophy, 2004; Steel & Konig, 2006). In the area of education, motivational issues are particularly salient since student motivation may influence learning outcomes, as well as student engagement in learning activities (Ciampa, 2014; Maehr & Meyer, 1997; Malone & Lepper, 1987). Motivation as a construct involves the "initiation, direction, intensity, persistence, and quality of behavior" (Brophy, 2004; Maehr & Meyer, 1997). Additionally, Smith, Sarason, and Sarason (1982) describe motivation as a desire, need, or process that influences an individual's goal-directed behavior. Rooted in subjective experiences, student motivation is connected to a willingness to engage and a rationale for engagement (Brophy, 2004). Together, these definitions create a framework for understanding students' motivations to engage with technology both in and out of the classroom. Considering motivation as a determinant for behavior, it becomes essential for educators who are integrating technology into the classroom to appreciate the specifics of what drives students' engagement (Guo, Li, & Stevens, 2012; Steel & Konig, 2006).

Many previous studies that explain the adoption of technology focus on motivation to use technology from an extrinsic, device, and functionality perspective. Extrinsic motivation denotes behaviors that are responses to something outside of oneself. Extrinsic motivation is often driven by the perception that completing an activity will bring about a valued outcome (Teo, Lim, & Lai, 1999). In addition to use of the technology, extrinsic motivators may include good grades and positive accolades that

come from exceling in academia (Ciampa, 2014). However, the critical role intrinsic motivators play in user acceptance and use must not be overlooked (Lee et al., 2005). Intrinsic motivation refers to completing an activity because the activity itself is interesting, pleasurable, or satisfying. Malone and Lepper's (1987) identify challenge, curiosity, and control as intrinsic motivations for learning.

Within the field of communication studies, Uses and Gratification (U&G) theory is used to explain individuals' motivation for media usage (Katz, Blumler, & Gurevitch, 1973). The U&G approach assumes users of technology are aware of their personal needs and have an active choice in meeting those needs, tying technology use to motivation. However, motivation in isolation creates an incomplete representation of the technology users' needs. As needs are hierarchical in nature (Maslow, 1943), Guo et al. (2012) integrate Means-End Chain (MEC) approach along with U&G theory to express student technology use motivations as a set of interrelated and hierarchically arranged elements. Within their study, they utilize MEC to explain "using a particular information technology in learning should not be seen as a student goal of technology use, but rather as a means of fulfilling their needs" (Guo et al., 2012). Additionally, researchers employ the Repertory Grid Interview Technique to identify university students' motivations for using technologies for educational purposes. By participants completing triadic sorting of concepts and interviewers probing with how and why questions, researchers identify both conceptual content and the connections between concepts (Guo et al., 2012). Ultimately, Guo et al. (2012) conclude that motivations for technology use are interrelated with student goals and influence one another.

Ciampa (2014) also demonstrates that motivations to engage technology for educational use are linked to the personal goals of challenge, curiosity, control, recognition, competition, and cooperation. These intrinsic and extrinsic motivators when embedded in learning activities can increase student motivation (Ciampa, 2014; Malone & Lepper, 1987). Additionally, both intrinsic and extrinsic motivators are drivers of technology use behavior (Ciampa, 2014; Lee et al., 2005; Sanchez & Hueros, 2010; Teo et al., 1999).

Ciampa's (2014) research combines mobile learning and motivation while extending Malone and Lepper's (1987) work. Examining the intrinsic motivators of challenge, curiosity, and control, as well as the extrinsic motivators of recognition, competition, and cooperation, Ciampa (2014) explains that these same motivators are present in mobile technology use for educational purposes. Mobile learning apps provide opportunities for students to progress at their own rate tapping into the intrinsic motivator of control. Students are self-regulated learners exercising choice of the apps used for learning. Furthermore, appropriate challenge coupled with immediate feedback increases cognitive curiosity, leading to additional use of the apps at home (Ciampa, 2014).

Teacher Beliefs and Technology Self-efficacy

Self-efficacy is defined as one's personal judgment of his or her ability to succeed in the performance of a particular task or skill (Bandura, 1986; Zimmerman, 2000). With the prevalence of technology in schools, teacher attitudes and technology self-efficacy have been the focus of many studies (Ertmer et al., 2012; Gokcek, Gunes, & Gencturk, 2013; Holden & Rada, 2011). These studies measure teacher self-efficacy in relation to a multiplicity of variables: gender, duration of teaching experience, frequency of use, and

training. Independent of the variables examined, self-efficacy beliefs are shown to influence teachers' performance in the classroom (Gokcek et al., 2013). Bandura (1986) points out "teachers who believe strongly in their instructional efficacy create mastery experiences for their students. Those beset by self-doubts construct classroom environments that are likely to undermine students' sense of efficacy and cognitive development" (p. 140).

The importance of teacher technology self-efficacy must not be overlooked considering its potential effects on student outcomes. Teachers with high instructional self-efficacy provide the scaffolding for the development of students' intrinsic interests and self-directedness (Bandura, 1993). Moreover, Kim, Kim, Lee, Spector, and DeMeester (2013) suggest teachers' beliefs, synonymous with self-efficacy in many studies, are related to technology integration. Although it is assumed that these beliefs are related, "correlation does not imply causation" (Kim et al., 2013, p. 82), leading to the findings that teacher beliefs do not always guide technology integration (Belland, 2009; Chen, 2008, Kim et.al, 2013). However, the International Society for Technology Education (ISTE) emphasizes the importance of technology efficacy in the ISTE Standards for teachers:

- Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.
- Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to

maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the Standards.

- Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.
- Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.
- Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. (ISTE/, n.d)

These standards link content knowledge, pedagogy, and technology with teacher efficacy.

An underlying assumption in the ISTE standards is a high level of teacher technological pedagogical knowledge. TPACK, an expansion of Shulman's (1986) understanding of teachers' pedagogical and content knowledge, addresses the interaction between teachers' knowledge of content, pedagogy, and technology (Koehler, Mishra, & Cain, 2013). While daily instruction continues to shift away from learning about technology, many teachers still tend to use technology as an information delivery tool. Additionally, a strong connection remains between teachers' beliefs about the role of technology in the classroom and authentic use of technology by both teacher and student (Ertmer & Ottenbreit-Leftwich, 2013). It is necessary to consider the influence beliefs have on the acquisition and interpretation of new knowledge. Pajares (1992) reports that "beliefs are far more influential than knowledge in determining how individuals organize

and define tasks and problems and are stronger predictors of behavior" (p. 311). On the opposite end of the spectrum, Koehler, Mishra, and Cain (2013) contend, "the development of technological pedagogical content knowledge (TPACK) by teachers is critical to effective teaching with technology" (p. 13). These seemingly contradictory positions work together to highlight the interconnectedness of teacher beliefs and knowledge. In a review of research on teachers' beliefs, Pajares (1992) concludes,

> Beliefs influence what teachers say outside the classroom, but their behavior in the classroom is a result of beliefs (and here is the twist) being filtered by experience. Knowledge, on the other hand, represents efforts to make sense of experience, and thus, knowledge, not belief, ultimately influences teacher thought and decision making. (p. 312)

While the significance of increasing teacher TPACK cannot be overstated and Ertmer and Ottenvreit-Leftwich's (2013) assert the importance of encouraging teachers' technology integration efforts, it is equally important to address second-order barriers of beliefs and attitudes.

Chapter Three

Methodology

This chapter provides an overview of the research methods used in this study in order to gain a greater understanding of the relationship between the factors driving personal technology use and successful employment of integrated technology for educational purposes. Examining how technology is used in everyday life and the motivation for its use is necessary since K-12 schools continue to invest in technology as a means to enhance educational outcomes.

Appropriateness of Study

This study relied on an explanatory sequential mixed method design, employing the sequential collection of quantitative data followed by the collection of qualitative data. The sequential nature of this study allowed the quantitative data to serve as a basis for the qualitative data to follow (Cameron, 2009). This two-phase, single study, sequential model initially relied more heavily on the quantitative data and analysis, then looked to the qualitative data to explain, refine, and elaborate the quantitative findings (Creswell, 2008; Morgan, 2014). The use of a mixed methods design provides the opportunity for an in-depth understanding of the research question and a richer analysis stemming from the use of both quantitative and qualitative data (Caruth, 2013; Creswell, 2008). In addition, the mixed methods design supports the understanding of potentially contradictory findings and move the study beyond the initial quantitative results (Caruth, 2013; Morgan, 2014).

The purpose of this study was to understand teachers' and students' technology self-efficacy and attitudes toward technology usage as it affects technology use in the

classroom. The multifaceted nature of this study necessitates the blending of data collection methods, analysis, interpretation procedures, and reporting methods. Morgan (2014) suggests matching the research purpose to the research design, linking methods to enrich the outcome of the findings. Assessing motivational factors for engaging with technology for personal use alongside perceptions of the value of technology provides a more nuanced understanding of the acceptance of technology use for educational purposes.

With the blending of not only methods but also epistemological assumptions and stances, Onwuegbuzie (2012) proposes a switch in terms from mixed methods research to mixed research. Breaking down the dichotomy between quantitative and qualitative research opens a third space where different ways of creating understanding become fluid and dynamic. Greene (2007) describes mixed research as a way of thinking:

> Multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished. A mixed methods way of thinking rests on assumptions that there are multiple legitimate approaches to social inquiry and that any given approach to social inquiry is inevitably partial… A mixed methods way of thinking is thus generative and open, seeking richer, deeper, better understanding of important facets of our infinitely complex social world. A mixed methods way of thinking generates question, alongside possible answers. It generates results that are both smooth and jagged, full of relative certainties alongside possibilities, and even surprises, offering some stories not yet told. (p. 20)

Greene's definition of a mixed research way of thinking guided the design of this study, exploring the connection between motivation for personal technology use and the motivation to engage with technology in education.

Previous research addresses teacher self-efficacy, barriers for use, as well as teacher beliefs, and the connection to technology integration (Belland, 2009; Ertmer et.al, 2012; Gorder, 2008; Liu & Huang, 2005; Padmavathi, 2013). This current study attempted to add student data into the discussion. Understanding students' motivation to engage with technology and the crossover to the acceptance and use of technology for educational purposes is pivotal to this study; therefore, providing a platform for students to participate in the dialogue is paramount. Focus groups' open-ended interviews provided the opportunity for "participants to voice their experiences unconstrained by any perspectives of the researcher" (Creswell, 2008, p. 225). Additionally, the use of focus groups is advantageous, as it allows a deeper investigation into the complex motivations associated with technology usage (Maxwell, 2013). Using multiple methods to gain information, various aspects regarding students' acceptance of and motivation to use technology for educational purposes was considered. The addition of student perceptions, along with teacher input, created a dimensionality to the research missing from previous studies.

Theoretical Framework

The constructivist epistemology, with roots in Piaget and Dewey, states that children acquire/create knowledge by interacting with the environment and creating relationships (Walker, 2003). Based on Piagetian theory, the role of the teacher is to create an environment in which students can engage in authentic learning experiences

(Tryphon & Voneche, 1996). The constructivist classroom provides students the opportunity to construct meaning through experience and inquiry. Working actively in peer groups, students work collaboratively to co-construct knowledge through an iterative process. Additionally, Dewey theorized that students learn through action, creating knowledge out of experiences that have personal meaning and importance (Walker, 2003). Using integrated technology in K-12 classrooms, teachers can create a rich student learning environment full of authentic student experiences. Integrated technology provides multiple opportunities to tap into the intrinsic and extrinsic motivation of students (Malone & Lepper, 1987). Constructivist theory forms a bridge to Davis' (1989) Technology Acceptance Model (TAM) as a theoretical framework to understand how students engage with technology for educational purposes.

The study of individual use and acceptance of technology has been widely researched (Davis, 1989; Malone & Lepper, 1987; Venkatesh, Thong, & Xu, 2012). Malone and Lepper (1987) identify a taxonomy of intrinsic motivation for learning. The taxonomy includes six categories of individual motivators that apply to technology acceptance. Challenge, curiosity, and control are classified as intrinsic motivators while cooperation, competition, and recognition are identified as extrinsic motivators. "Many learners are motivated and excited to use mobile devices; as yet, however, there is little understanding of what it is that makes learning with mobile devices so engaging and motivating to use" (Ciampa, 2014, p. 82). If educators hope to capitalize on available technology to enhance academic outcomes, it is imperative to understand student motivators and create learning opportunities that exploit these characteristics. An in-depth examination of the influence personal attitudes toward technology use have on

actual engagement in education may lead to a better deployment and integration of technology in education.

While Lepper and Malone consider motivation and technology acceptance, Davis' 1989 Technology Acceptance Model addresses the constructs of users' perceived ease of use and perceived usefulness leading to behavioral intention to engage technology. Additionally, TAM is designed to describe motivating factors present when using a variety of technologies (Davis, Bagozzi, & Warshaw, 1989).

By merging multiple theories of technology use and acceptance, Venkatesh, Morris, Davis, and Davis (2003) organize factors associated with behavioral intention to use technology and technology use into four key constructs, creating the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT constructs include: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions. Gu, Zhu, and Guo (2013) have reviewed studies examining the factors influencing technology use and acceptance. As a result of their review, they identify outcome expectancy, task-technology fit, social influence, and personal factors as constructs frequently stated as predictors of technology use and acceptance.

This study employed a framework created through the integration of key constructs from the UTAUT and the four constructs predictive of technology usage complied by Gu, Zhu, and Guo (2013). Figure 1 presents the parallel structure of the UTAUT and Gu, Zhu, and Guo's predictive constructs. Building from these theoretical frameworks, Figure 2 represents the integration of several constructs. Self-efficacy, performance expectancy, task-technology fit, and personal factors create the domains considered in the acceptance of technology for educational purposes within this study.

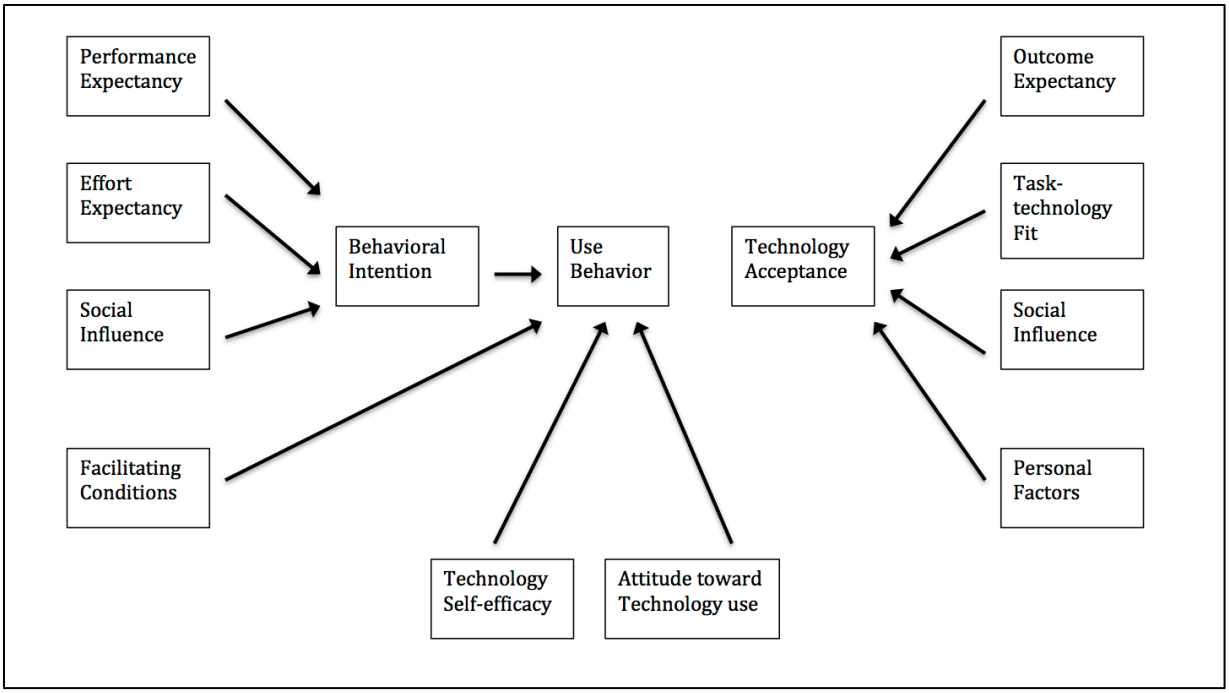

Figure 1. Comparison of the UTAUT and Gu, Zhu, and Guo's predicative constructs. Venkatesh et al. (2003) Unified Theory of Acceptance and Use of Technology compared to the constructs of Gu, Zhu, Guo's (2013) predicative constructs for technology acceptance. Additional constructs of Technology Self-efficacy and Attitudes toward Technology Use added as part of this study.

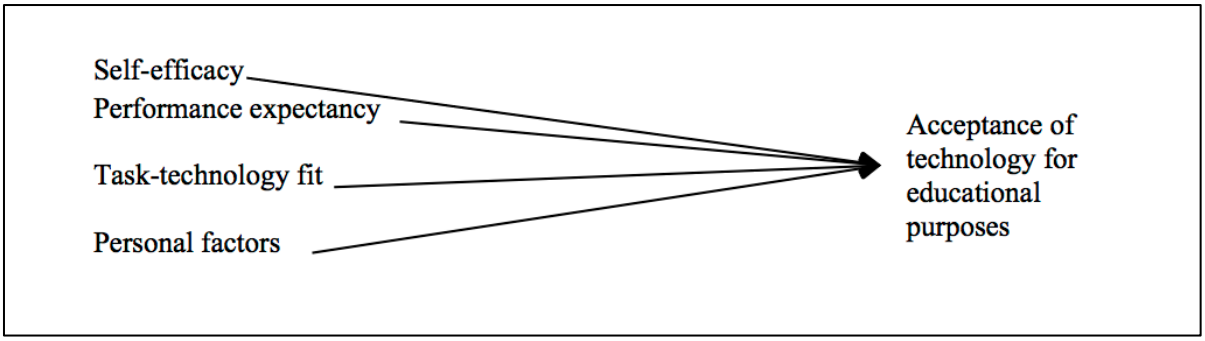

Figure 2. Integrated Framework designed for current study. Constructs within the integrated framework affecting students' and teachers' acceptance of integrated technology in the classroom.

Research Questions

The following research questions guided this study:

1. To what degree do students' and teachers' technology self-efficacy and personal technology usage affect the use of technology for educational purposes?
2. What are students' perceptions of specific technological practices used in the classroom?

3. What technology tools (both hardware and web tools) do students and teachers use and how frequently do they use them?
4. How does personal technology use correlate with educational technology use?

Research Design

Factors affecting acceptance and use of technology in education can be complex (Inan & Lowther, 2010) requiring a methodology that allows for the development of a multifaceted picture of the phenomenon (Greene, Kreider, & Mayer, 2011). A mixed methods explanatory sequential research design was utilized in order to examine several of these factors: the acceptance, use, and attitude toward technology in education. This design was selected to increase the capacity of the qualitative results by the sequential contribution of the qualitative results (Morgan, 2014). The explanatory sequential design (Creswell, 2008) indicates that quantitative and qualitative data collection procedures need to be independent of one another with data collection taking place over multiple visits. To explore the crossover of personal technology use into the academic setting and attitudes toward technology, quantitative survey data preceded focus group interviews to explain and expand the survey data.

The study was comprised of student and teacher quantitative survey data and qualitative focus groups interview data. The student survey respondents were members of the 7th and 10th grade classes with the focus group made up of students who had access to the survey. A total of 15 students participated in the focus groups.

Table 1

Demographics of Student Focus Group Participants

	7th Grade	10th grade	Race
Male	5	2	100% white
Female	4	4	100% white

To ensure a large enough teacher sample size all middle school and high school teachers in the county were invited to participate in the study. Eleven teachers indicated interest in participating in the focus group. Ultimately, seven teachers participated in the focus groups. Although the focus groups were open to all teachers in the middle schools and high school, participant availability was reduced due to scheduling issues. The selection of available teachers for the focus group created a convenience sample that may not be representative of the teacher population in the selected schools (Creswell, 2008). All the teachers in the focus group indicated a high level of personal technology use and a positive attitude toward technology use in school. Although this disposition toward technology was apparent throughout the interviews, reflective comments regarding previous attitudes surfaced.

Table 2

Demographics of Teacher Focus Group Participants

	Middle School	High School	Experience	Race
Male	0	1	1 year	white
Female	4	2	2 years – 2 7 years – 1 15+ years – 3	white

The school district consists of one high school, two middle schools, and five elementary schools, serving 2130 students. The school district self-identifies as a 21st century district and recently introduced a one-to-one laptop initiative, assigning laptops to all high school students and equipping all elementary classrooms with enough iPads for one-to-one use. The sequential scheme of the explanatory mixed methods design, with quantitative data collected first, followed by qualitative data, allowed for deeper inquiry into the quantitative findings and the comparison of teacher and student data on several variables (Creswell, 2008).

Rationale for the Design

Research in educational settings is difficult "because humans in schools are embedded in complex and changing networks of social interaction" (Berliner, 2002, p. 19). The complexities inherent in education research support the use of a method of inquiry that is driven by methodological purposes (Greene, Kreider, & Mayer, 2011). The quantitative survey data regarding technology use and acceptance, once collected, worked to inform the design of the interview questions, enhancing the strength of either method used individually (Morgan, 2014). The integrated design created a blended data set for analysis, leading to an understanding of the research topic (Greene, Kreider & Mayer 2011). Johnson and Onwuegbuzie (2004) assert the potency of mixed methods research comes from drawing on the strengths, while minimizing the weaknesses of either research paradigm.

Ethical Considerations

Within the field of educational research, ethical issues are central concerns (Creswell, 2008; Somekh, Burman, Delamont, Payne, & Thorpe, 2011). This research

followed all the guidelines set forth by the Internal Review Board (IRB) for working with human subjects. The researcher established a relationship of care and respect with the schools, students, and teachers engaged in this study. Consideration of consequence of presence, selective experience, and engaged subjectivity within the qualitative portion of this study was considered (Schram, 2006). Further care was taken to acknowledge the power differential apparent when collecting data (Somekh et al., 2011). The mixed methods sequential explanatory design of the study with student and teacher interviews afforded participants the opportunity to voice their values and perceptions of technology use and acceptance.

Setting

The setting for this study included two middle schools and a high school in rural western North Carolina. The two middle schools are only eight miles apart; however, one is located in the center of a small town while the other is located in a more rural section of the county. Both middle schools send students to the same county high school. The schools are part of the larger county school system serving all students within the county. According to the school's website, the county school system has a total student population of approximately 2,130. Additionally, system-wide student demographics indicate an ethnicity composite of 91% white, 8% Hispanic, and 1% two or more races; 50% female to 50% male gender balance; and 62% of students receiving free or reduced lunches. Census data indicates a mean family income of $36,969 with 18% of the families living below the national poverty level (US Census Bureau, 2014).

The researcher selected this school system to participate in this study for three reasons: (a) the school system has embraced technology integration, identifying

technology issues as the top two priorities in the current school system's strategic plan; (b) the school has implemented a one-to-one digital conversion with each teacher receiving a laptop to serve as his/her primary device for instructional purposes and each middle and high school student receiving a laptop for exclusive use at school; and (c) the schools are within a 50 mile radius of the researcher and expressed a willingness to participate in the study. Additionally, the county has committed to continual staff development in the area of integrated technology.

Data Sources

Quantitative data were collected through an online survey given to all 7th and 10th grade classes at "A" Middle, "C" Middle, and "A" High School. The data were examined and analyzed prior to the focus group interviews. Results from the survey informed focus group questions with the intent to explore in greater depth the survey findings (Wolff, Knodel, & Sittitrai, 1993). The surveys were designed to discern how students and teachers currently engage with technology for both personal and educational use as well as the value they place on the use of the same technology for educational purposes. Furthermore, the survey questions teased out additional factors affecting students' acceptance of specific technologies for educational purposes. The integrated domains of the study drawn from the key constructs of the UTAUT and Gu, Zhu, and Guo's (2013) concepts predictive of technology usage guided the development of the teacher and student survey questions. It was through the analysis of the survey findings that the focus group questions were created. Within the focus group interviews, specific emphasis was placed on probing into technology self-efficacy along with task-technology fit as implications toward acceptance and use of technology in the educational setting. The use

of quantitative survey data followed by qualitative data from focus groups allowed this study to "develop explanations that are not available within the survey data" (Morgan, 2014, p. 157).

As one component of this study attempted to understand students' current use of technology outside of the classroom, a single cross-sectional survey was given to students at the schools to examine student use and motivational factors. Additionally, a cross-sectional survey to examine the type of integrated technology used in the classroom and its purpose was given to teachers at the schools. As cross-sectional surveys collect data at one point in time and are efficient in gathering large volumes of information quickly, the resulting data examined teachers' and students' current perspectives on technology use (Creswell, 2008; Fink, 2013). This study anticipated the empirical data from the survey to shed light on students' current use of technology, motivations for use, self-efficacy, and their acceptance of technology use for educational purposes.

Surveys. This explanatory study employed two distinct, yet parallel composite surveys. The specific surveys were designed for students and teachers. Both surveys were constructed using subscales from previous studies on technology in education (Liou & Kuo, 2014; Niederhauser & Perkmen, 2008; Ritzhaupt, Dawson, & Cavanaugh, 2012; Rosen, Whaling, Carrier, Cheever, & Rokkum, 2013). The sample electronic version was sent to teacher candidates to pilot the survey and collect data for the factor analysis of the subscales on both the student and teacher survey constructed for this study.

Students received a modified version of

- the media and technology usage and attitudes scale (MTUAS) (Rosen et al., 2013);

- the students' motivation and self-regulation toward technology learning (MSRTL) (Liou & Kuo 2014);
- two subsections of the teacher technology survey (TTS) (Ritzhaupt et. al, 2012): the student use of technology survey (SUTS) and the classroom technology integration survey (CTIS).

Minor revisions were made to the subsections of the TTS to account for the advancements in technology, representing current trends in software applications and mobile computing. Additional demographic data were collected to ensure representative samples.

Teachers received a modified version of

- the media and technology usage and attitudes scale (MTUAS);
- the intrapersonal technology integration scale (ITIS) (Niederhauser & Perkmen, 2008);
- two subsections of the teacher technology survey (TTS): the teacher use of technology survey (TUTS) and the classroom technology integration survey (CTIS).

As with the subsections of the TTS given to students, the same revisions were present in the TTS given to teachers to accommodate for the advancements in technology.

Table 3

Survey Instruments and Correlating Constructs

Instrument	Author	Participant	Construct Measured
Media and technology usage and attitudes scale (MTUAS)	Rosen et al., 2013	Teacher, Student	Personal factors –self-reported frequency of use, attitudinal beliefs about technology
Students' motivation and self-regulation toward technology learning (MSRTL) Scales 1 and 2	Liou & Kuo, 2014	Student	Technology self-efficacy, technology learning value
Student use of technology survey (SUTS); subset of the Teacher technology survey	Ritzhaupt et al., 2012	Student	Frequency of use in school
Classroom technology integration survey (CTIS); subset of the teacher technology survey	Ritzhaupt et al., 2012	Student	Frequency of use in school
Intrapersonal technology integration scale (ITIS)	Niederhauser & Perkmen, 2008	Teacher	Self-efficacy, performance expectancy
Classroom technology integration survey (CTIS); subset of the teacher technology survey	Ritzhaupt et al., 2012	Teacher	Frequency of use in school
Teacher use of technology survey (TUTS); subset of the teacher technology survey	Ritzhaupt et al., 2012	Teacher	Frequency of use in school

The creation of a composite scale fills the gap of available research tools by providing a comprehensive measurement tool that incorporates frequency of use as well as attitudes towards use that could be used across research paradigms. Previous studies on technology usage typically measured usage in terms of minutes or hours of engaging in various computer activities through self-reporting (Rideout et al. 2010; Rosen et al,

2013). With the prevalence of mobile computing, time no longer is a reasonable indicator for technology use (Rosen et al., 2013).

MTUS developed by Rosen et al. (2013) takes into account previous studies for evaluating technology usage. The MTUAS measures frequency of use on various technologies including mobile devices, stationary computers, as well as dedicated devices such as mp3 players. Two subscales make up the MTUAS: the usage subscale consists of 44 items focusing on frequency of use with specific technologies while the 16 items on the attitudes subscale address positive attitudes toward technology, anxiety/dependence on technology, negative attitudes toward technology, and task-switching preferences (Rosen et al., 2013).

The frequency subscale is a 10-point scale ranging from 1 (*never*) to 10 (*all the time*) while the attitudes scale is a 5-point Likert scale ranging from 5 (*strongly agree*) to 1 (*strongly disagree*). The MTUAS subscales were subjected to a varimax rotation factor analysis and demonstrated strong reliability and validity (Rosen et al., 2013).

Created through the modification and adaptation of Tuan, Chin, and Shieh's (2005) existing scales intended to gauge students' attitudes towards science learning, the Motivation and Self-regulation towards Technology Learning (MSRTL) instrument is designed to measure students' motivation and self-regulation toward technology learning (Liou & Kuo, 2014). The MSRTL consists of 39 questions within six subscales: technology self-efficacy, technology learning value, technology active learning strategies, technology learning environment stimulation, technology learning goal-orientation, and technology learning self-regulation. Each scale is designed using a 5-point Likert scale ranging from 5 (*strongly agree*) to 1 (*strongly disagree*).

Confirmatory factor analysis indicates factor loading values of .53 to .90 with all values exceeding the criterion of .50 demonstrating satisfactory validity and the independence of each subscale (Liou & Kuo, 2014). As only the subscales of technology self-efficacy and technology-learning value are germane to this study, only the first two sections of instrument are included in the survey for student research participants. For reliability of the responses to the questions loaded on this factor, the analysis reveals a Cronbach's alpha coefficient of greater than .70, demonstrating satisfactory reliability for assessing the stated intention of the instrument.

The subscales SUTS and TUTS of the TTS that were employed in this study are designed to capture the frequency of technology use by the teacher and student in the classroom. The TUTS and SUTS identify specific software such as MS word, Dreamweaver, and PhotoShop for respondents to consider. To account for the advancements in technology, minor revisions were made to the CTIS, TUTS, SUTS, and all subsections of the TTS, substituting current software applications and mobile apps for increased relevance. Each subscale consists of a 5-point Likert scale with responses ranging from 1 (*not at all*) to 5 (*everyday*). Additionally, the CTIS measures approaches to learning intended by the use of integrated technology (Ritzhaupt et al., 2012). Previous studies indicate through factor analysis "psychometrically sound factors and measures of internal consistency reliability exceeding .70 for each domain" (Harmes, Kemker, Kalaydjian & Barron, 2000; Hogarty & Kromrey, 2000; Ritzhaupt et al., 2012).

The Intrapersonal Technology Integration Scale (ITIS) is the final scale selected for use with teachers. Considerable research has taken place in the area of teacher self-efficacy and teacher self-efficacy for technology integration (Bandura, 1993; Gorder,

2008; Ertmer et al., 2012; Holden & Rada, 2011; Zimmerman, Bandura, & Martinez-Pons, 1992). The ITIS has been developed to enhance this body of literature through the inclusion of intrapersonal cognitive variables such as self-efficacy, outcome expectancy, and interest (Niederhauser & Perkmen, 2008). With three subscales, self-efficacy, outcome expectancy, and interest, the ITIS consists of 25 items. Participants indicate their level of agreement on a 5-point Likert scale designed in the form of statements and ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Factorial validity and internal consistency analyses demonstrate that each subscale forms distinct constructs and strong internal consistency (Niederhauser & Perkman, 2008; Stewart, Antonenko, Robinson, & Mwavita, 2013).

Focus groups. The explanatory nature of the study supports the inclusion of focus group interviews. Although interviews can be challenging, they can be one of the most rewarding forms of measurement (Trochim, 2006). Student and teacher focus group interviews provided the qualitative data for this study.

Glesne (2011) describes interviewers as "listeners incarnate; machines can record, but only you can listen" (p.118). As a listener, I provided open-ended questions to allow for authentic open-ended responses. Focus group members were given the opportunity to further describe personal connections with technology, share in-depth explanations of technology use in the classroom, and expound on personal factors driving technology engagement. The integrated framework of this study provided guidance for follow-up questions. Additional questions were added within the focus groups, as needed, to delve deeper into the responses given.

The initial focus group protocol included five questions with probes designed to gain a greater understanding through expanding on interviewees' answers and to ensure consistency among interviewees. Initial focus questions were developed based on quantitative data from the MTUAT given to both teachers and students, the MSRTL given to students, and the ITIS given to teachers. Teacher focus group participants were selected from the pool of possible survey respondents, and inclusion in the focus group interview was voluntary. The student focus groups consisted of students who had access to participate in the technology survey. Middle school students were selected based on the return of parent permission forms. High school students were selected based on their participation in the student advisory council, an advisory board representative of the student population within the county. The focus groups interviews were conducted at the site school, lasted 30-45 minutes, and were recorded for later transcription. Care was taken to destroy all digital recordings following the completion of the research. Permission for inclusion in this study followed IRB standards for research with human subjects with signed consent from all participants in a locked file within the researcher's office.

The complexity of analyzing the effect of technology self-efficacy and personal usage on technology integration in the classroom was considered in the design of the mixed method approach in this study. Qualitative data were collected to enrich the understanding reached through quantitative analysis. Throughout the research process, the researcher used field notes as a means of reflection to identify any bias brought to the process. These notes were considered during the analysis of the qualitative data. The

following chapter provides an overview of the findings from the quantitative and qualitative data collection.

Chapter Four

Results

The overarching purpose of this study was to examine factors influencing the acceptance of technology for educational purposes by both students and teachers. Through the use of mixed methods explanatory design, this study considered many factors shaping technology self-efficacy and its role in technology acceptance. The findings presented in this chapter include quantitative analysis of student and teacher survey results from the composite survey instrument compiled for the study. The composite survey consisted of scales intended to measure technology self-efficacy, attitudes toward use of technology, technology tools used, and frequency of use. Additionally, the analysis of the qualitative data collected is offered to provide support and further understanding of the quantitative findings.

The primary research question of "to what degree does students' and teachers' technology self-efficacy and personal technology usage affect the use of technology for educational purposes" was supported by four underlying questions:

- What is the relationship between self-efficacy and attitude toward technology use?
- What are students' perceptions of specific technological practices used in the classroom?
- What technology tools (both hardware and web tools) do students and teachers use and how frequently do they use them?
- How does personal technology use correlate with educational technology use?

Together these questions directed both the qualitative and quantitative data collection.

Descriptive Statistics

The school system, with financial support from the county, implemented a system-wide one-to-one computer initiative three years prior to this study. This initiative provided middle and high school students personal laptops for use at school and home while elementary students were assigned personal iPads for use at school. Teachers were also assigned laptops for use at home and school. A wireless network was installed on each campus with access to the Internet provided through a password-protected portal. The physical location of the county in the mountains of North Carolina limits Internet access for many residents of the county; 21% of student survey respondents indicated no Internet access at home.

The school system adopted Haiku as the learning management system (LMS) for all middle and high school students with an additional LMS for students involved in Project Lead the Way. The decision to deliver all surveys electronically was based on the extensive use of the LMS and the one-to-one computing already in place within the school system indicating a level of technology familiarity. The composite student survey was administered during a homeroom period where students had the opportunity to voluntarily participate via a web link. The overall survey completion rate for the student group was 82%. The teacher version of the composite survey was also delivered electronically and was available online during a four-week period for all certified teaching staff in the middle and high school (N=104) to voluntarily participate during a convenient time. The completion rate for the teacher group was 43%. To increase teacher participation, personal presentations were given at a series of faculty meetings; the majority of the participants resulted from this interaction. These teachers expressed

interest in receiving the results as part of their ongoing technology professional development.

The target student population for this study was students enrolled in the 7th grade (*N*=147) and 10th grade (*N*=160) in the participating schools (*N*=3) within "A" County, North Carolina. This decision was based on the assumption that students in those grades possessed the necessary technology experience to provide insight to the study. To ensure a large enough sample size, all middle and high school teachers in the participating schools were invited to join in the study (*N*=104).

Table 4

Survey Response Rate by Category

Respondent category	Sent	Returned	Response rate (%)
Student - 7th	147	106	72
Student - 10th	160	146	91
Teachers	104	45	43

The demographics of the teachers who completed the survey are outlined in Table 5. Student participant demographics are outlined in Table 6. All response choices are listed along with "no answer" to indicate incomplete data sets. This section of the survey was optional, as was each question in the survey, and not all respondents chose to respond to every variable. The sample closely reflects the gender and race demographics of the school system as reported in the methods section of this study, as well as the overall demographics of the county based on recent census data (US Census Bureau, 2014).

Table 5

Demographic Information of Teacher Survey Respondents as a Percentage of the Sample

Variable	Answer Options	Percent (*N*=45)
Gender	Male	31
	Female	69
	No answer	
Age	18-25	
	26-35	29
	36-45	27
	46-55	33
	over 56	9
	No answer	2
Race	Black/African American	
	Hispanic/Latino	
	White	96
	Racially mixed	
	Other	2
	No answer	2
Grade – Taught	7^{th}	7
	10^{th}	82
	Other	1
	No answer	
Experience in years	1-3	16
	4-8	9
	9-15	23
	16-20	26
	21 or more	25
	No answer	1

Table 6

Demographic Information of Student Survey Respondents as a Percentage of the Sample

Variable	Answer Options	Percent (*N*=277)
Gender	Male	48
	Female	52
	No answer	
Age	12-13	44
	14-15	38
	16-17	17
	18 and over	1
	No answer	
Race	Black/African American	1
	Hispanic/Latino	7
	White	87
	Racially mixed	4
	Other	2
	No answer	
Grade – enrolled	7^{th}	38
	10^{th}	53
	No answer	9
GPA	1.00-1.99	5
	2.00-2.99	20
	3.00-3.99	55
	4.0 or above	20
	No answer	
Access to internet at home	No	21
	Yes	79
	No answer	

Results

To address the constructs of students' and teachers' technology self-efficacy and attitudinal beliefs about technology, two distinct scales were included within the surveys. Items included in each scale were determined by a factor analysis completed on data from a preliminary survey. The multiple constructs were evaluated using a Cronbach's Alpha test to measure for internal consistency establishing the degree to which each item addresses the same underlying construct. The self-efficacy scale consisted of 12 questions. The scale had a high level of internal consistency, as determined by a Cronbach's alpha of .912. The construct of attitudinal beliefs about technology use consisted of 10 questions. The scale had an acceptable level of internal consistency, as determined by a Cronbach's alpha of .788.

The mean and standard deviation for each item on the technology self-efficacy scale and attitudes toward technology use scale were analyzed separately looking at trends within the student and teacher groups. The mean and standard deviation for each variable within the students' self-efficacy scale are outlined in Table 7 and the variables for the attitudinal scale are outlined in Table 8. Two student data sets were eliminated from all calculations due to a large number of missing cells. Each variable asked the student to indicate the degree of agreement on a 5-point Likert scale ranging from 1 (*strongly agree*) and 5 (*strongly disagree*). In both tables, the items are listed from the lowest mean to the highest mean with lower mean score indicating stronger agreement.

Table 7

Survey Item Measuring Student Technology Self-efficacy

Survey Item	(*N*)	Mean	Standard Deviation
I usually do well with technology.	249	1.98	0.83
I think learning with technology is important because I can use it in my daily life.	248	2.20	0.95
It is important to have the opportunity to satisfy my own curiosity when learning with technology.	248	2.29	0.86
I think it is important to learn to solve problems with technology.	248	2.38	0.95
When I am being taught with technology, I can understand the concepts very well.	249	2.38	0.98
I think that is it important to participate in inquiry activities with technology.	248	2.55	0.84
I think learning with technology is important because it stimulates my thinking.	247	2.62	0.95
I feel that with technology anything is possible.	250	2.80	1.17

Table 8

Survey Item Measuring Student Attitudes toward Technology

Survey Item	(*N*)	Mean	Standard Deviation
I feel it is important to be able to find any information online whenever I want it.	253	1.90	0.81
I feel it is important to be able to access the Internet any time I want.	251	2.04	0.99
I think it is important to keep up with the latest trends in technology.	251	2.36	0.93
I feel I get more accomplished because of technology.	251	2.43	1.11

Technology will provide solutions to many of our problems.	249	2.44	1.04
I get anxious when I don't have the Internet available to me.	251	2.88	1.29
I get anxious when I don't have my cell phone.	251	2.91	1.40
I feel new technology makes life more complicated.	249	2.97	1.09
I feel technology makes people waste too much time.	249	3.23	1.11
I feel new technology makes people more isolated.	250	3.32	1.11

An initial analysis of the data from the self-efficacy and attitudes scales revealed that students possess a high level of technology self-efficacy and positive attitude toward technology as indicated by the mean scores. The mean score above "3" on the items "I feel technology makes people waste too much time" and "I feel new technology makes people more isolated" supports a positive attitude toward technology as the higher mean indicates disagreement with the statement.

The mean and standard deviation for each variable within the teachers' self-efficacy scale are outlined in Table 9, and the variables for the attitudinal scale are outlined in Table 10. As with the student survey, the variable asked the teacher to indicate the degree of agreement on a 5 point Likert scale with 1 equal to "Strongly Agree" and 5 equal to "Strongly Disagree." In both tables, the items are listed from lowest mean score to the highest mean score.

Table 9

Survey Item Measuring Teacher Technology Self-efficacy

Survey Item	(*N*)	Mean	Standard Deviation
I feel confident that I can effectively use instructional technology in my teaching.	39	1.85	0.63
I am interested in working with instructional technology tools.	40	1.85	0.70
I feel confident that I can regularly incorporate appropriate instructional technology into my lessons to enhance student learning.	40	1.90	0.55
Using instructional technology in the classroom will make it easier for me to teach.	40	1.95	0.81
Using instructional technology in the classroom will make my teaching more exciting.	39	1.97	0.74
Using instructional technology in the classroom will increase my effectiveness as a teacher.	40	2.18	0.90
I feel confident that I can help students when they have difficulty with instructional technology.	40	2.20	0.85
Using instructional technology in the classroom will increase my productivity.	40	2.35	1.00
Effectively using instructional technology in the classroom will increase my sense of accomplishment.	39	2.49	1.02
Using instructional technology is the classroom will make my teaching more satisfying.	40	2.53	1.01
I have interested in working on a project involving instructional technology concepts.	39	2.68	1.07

Table 10

Survey Item Measuring Teacher Attitudes toward Technology

Survey Item	(*N*)	Mean	Standard Deviation
I feel it is important to be able to find any information online whenever I want it.	42	1.38	0.54
I feel it is important to be able to be able to access the Internet any time I want.	42	1.40	0.66
I think it is important to keep up with the latest trends in technology.	41	1.80	0.75
Technology will provide solutions to many of our problems.	42	2.38	0.91
I get anxious when I don't have my cell phone.	42	2.57	1.11
I feel that with technology anything is possible.	42	2.69	0.98
I get anxious when I don't have the Internet available to me.	42	2.81	1.06
I feel new technology makes life more complicated.	41	3.51	0.93
I feel new technology makes people waste too much time.	42	3.74	1.06
I feel new technology makes people more isolated.	42	3.93	0.89

Examination of the self-efficacy and attitudes scales data from the teacher survey revealed that teachers possess a similarly high level of technology self-efficacy and positive attitude toward technology as demonstrated by the mean scores. The teacher responses indicated a mean score above "3" on the items "I feel technology makes people waste too much time" and "I feel new technology makes people more isolated." An additional mean score above "3" on item "I feel new technology makes people more isolated" supported a positive attitude toward technology as the higher mean score illustrated a stronger disagreement with the statement.

A Pearson's correlation was run to further examine the strength of relationship between attitudes toward technology and technology self-efficacy beliefs in both the student and teacher survey respondents. Using Cohen's (1988) benchmark of $|r| > .5$ denoting a strong correlation, preliminary analysis found moderate and strong positive correlations between the variables measured. The results of the analysis are shown in Tables 11 and 12.

Table 11

Correlation of Students' Attitudes toward Technology and Technology Self-efficacy

	I can understand the concepts very well	I usually do well with technology.	Learning w/tech is important b/c I can use it in my life.	Learning w/tech is important b/c it stimulates my thinking.
Important to Find Information whenever I want	.29***	.27***	.32***	.30***
Important to be able to access the Internet whenever I want	.30***	.36***	.33***	.29***
Important to keep up with the latest trends in technology	.39***	.39***	.44***	.49***
Anxious Without Phone	.22**	.19**	.27***	.32***
Anxious Without Internet	.24**	.23**	.27***	.29***
Technology will provide solutions to many of our problems	.39***	.40***	.49***	.51***
With technology anything is possibilities	.48***	.39***	.49***	.49***
I get more accomplished because of technology	.516***	.50***	.56***	.50***
New technology makes people waste too much time	.25***	.19***	.30***	.39***
New technology makes life more complicated	.30***	.33***	.19**	.37***
New technology makes people more isolated	.20**	.11	.16**	.19**
It is important to learn to solving problems with technology	.51***	.56***	.56***	.55***
Important to participate in inquiry activities with technology	.34***	.40***	.42***	.51***
Important to have the opportunity to satisfy my own curiosity when learning with technology	.36***	.43***	.46***	.47***

****Correlation is significant at the <.0001 (2-tailed)*
***Correlation is significant at the .01 level (2-tailed)*

Table 12

Correlation of Teachers' Attitudes toward Technology and Technology Self-efficacy

	Easier to Teach	Interest in Reading	Increase effectiveness	Interested in Technology	More Exciting	Confident	Increased Sense of Accomp	More Satisfying	Confident to Incorporate	Interest in work w/ Tech	Increase Productivity	Confident to Help
Important to Find Information	.45**	.25	.27	.16	.28	.52**	.29	.35*	.31	.22	.30	.20
Important to Access	.41**	.17	.33*	.19	.23	.46**	.36*	.37*	.25	.26	.38*	.24
Important to Keep Up	.55**	.25	.44**	.70***	.63***	.47**	.39*	.52**	.55**	.41**	.44**	.35*
Anxious w/o Phone	.34*	.00	.22	.27	.26	.31	.02	.18	.22	.14	.03	.08
Anxious w/o Internet	.19	.18	.41**	.26	.22	.26	.48**	.45**	.31*	.34*	.37*	.41**
Technology Solutions	.51**	.28	.59***	.46**	.48**	.52**	.38*	.53**	.50**	.35*	.51**	.25
Technology Possibilities	.21	.44**	.40**	.40**	.25	.19	.54**	.59***	.29	.54**	.60***	.53**
Accomplish more	.44**	.26	.58***	.48**	.40**	.43**	.42**	.55**	.60***	.44**	.48**	.42**
Waste of Time	.33*	.36*	.46**	.36*	.28	.44**	.31*	.41**	.38*	.25	.40**	.38*
More Complicated	.15	.34*	.30	.30	.19	.20	.15	.21	.18	.15	.26	.21
More Isolated	.16	.33*	.38*	.30	.34*	.29	.39*	.54**	.34*	.39*	.44**	.34*

****Correlation is significant at the <.0001 (2-tailed)*
***Correlation is significant at the .01 level (2-tailed)*
**Correlation is significant at the .05 level (2-tailed)*

Only "New technology makes people feel isolated" and "I usually do well with technology" had an insignificant correlation value within the student data, $p = .08$. The attitude factors of "I get more accomplished because of technology" and "technology provides solutions to many of our problems" were strongly correlated with *r*-values ranging from .50106 to .56825 for each of the self-efficacy factors. However, the teacher data indicated fewer significant correlations. The strongest significant correlations were demonstrated between the attitude factor of "technology provides solutions to many of our problems" and all but two self-efficacy factors. A strong correlation exists between believing technology provides solutions and belief that using instructional technology in the classroom will increase effectiveness as a teacher, $r = .59874$, $p < .0001$.

Wilcoxon Two-Sample Tests were run on all self-efficacy and attitudinal variables in common for students and teachers. Although the mean rankings indicated agreement within both the teacher and student sample group for the "important to be able to find information" and "important to access the Internet at any time," as well as "important to keep up with the latest trends in technology, " the Wilcoxon Two-Sample Test denoted a statistically significant difference between the teacher and student responses.

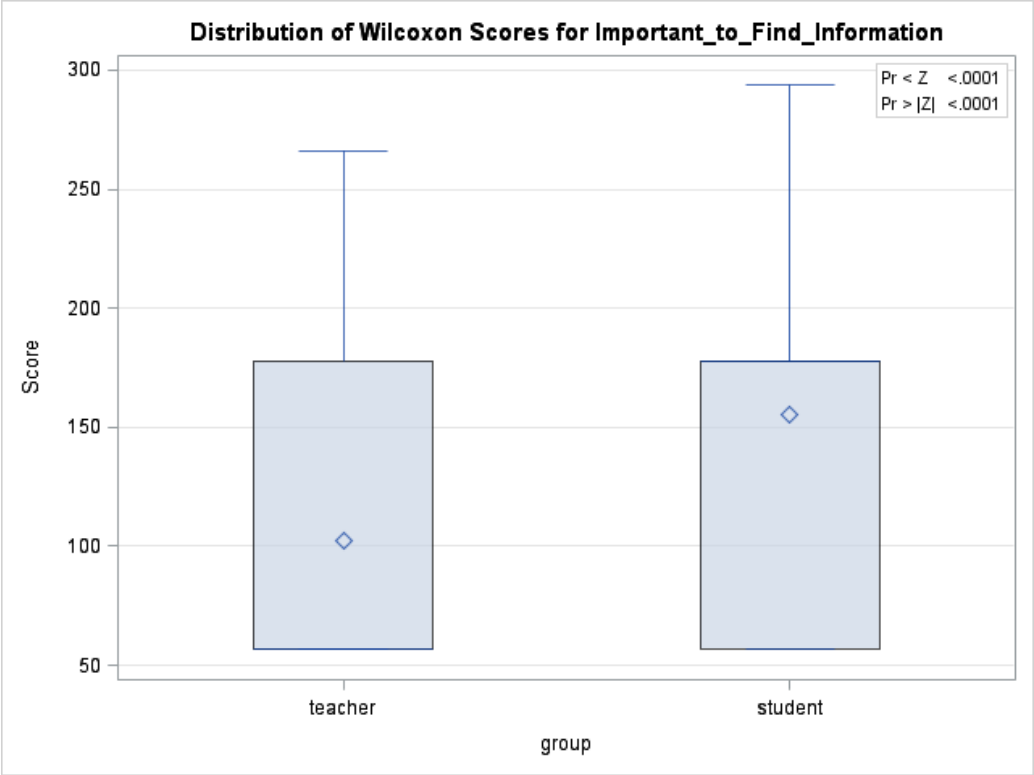

Figure 3. Distribution of Wilcoxon Scores for variable "Important to find information".

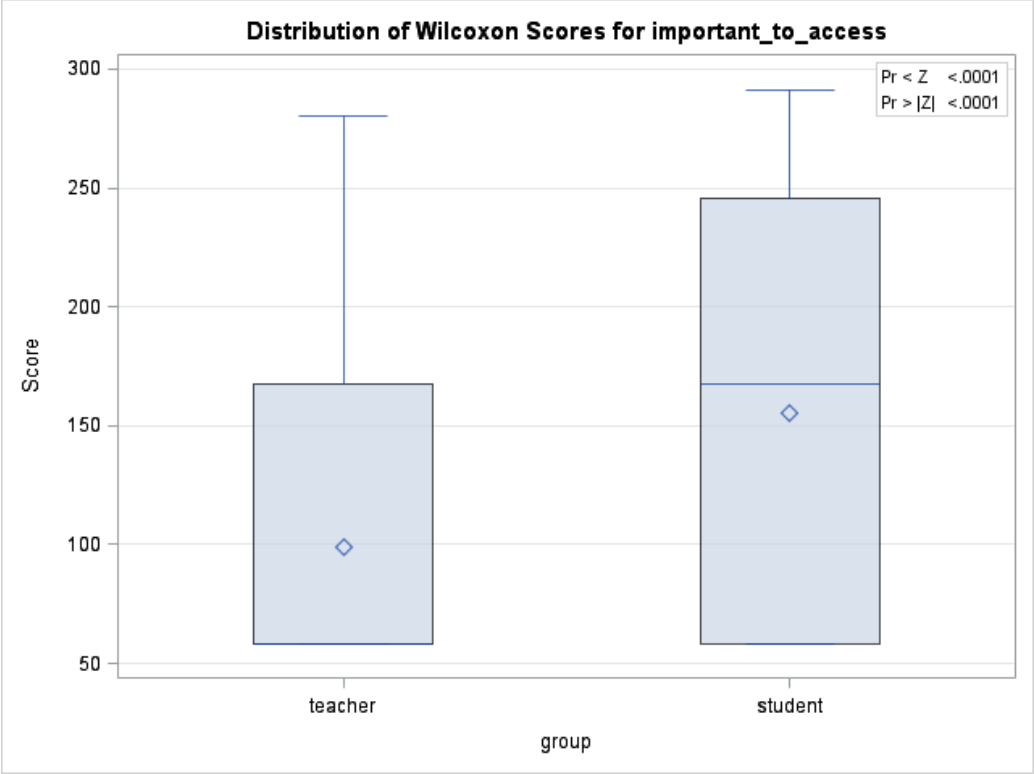

Figure 4. Distribution of Wilcoxon Scores for variable "Important to access the Internet".

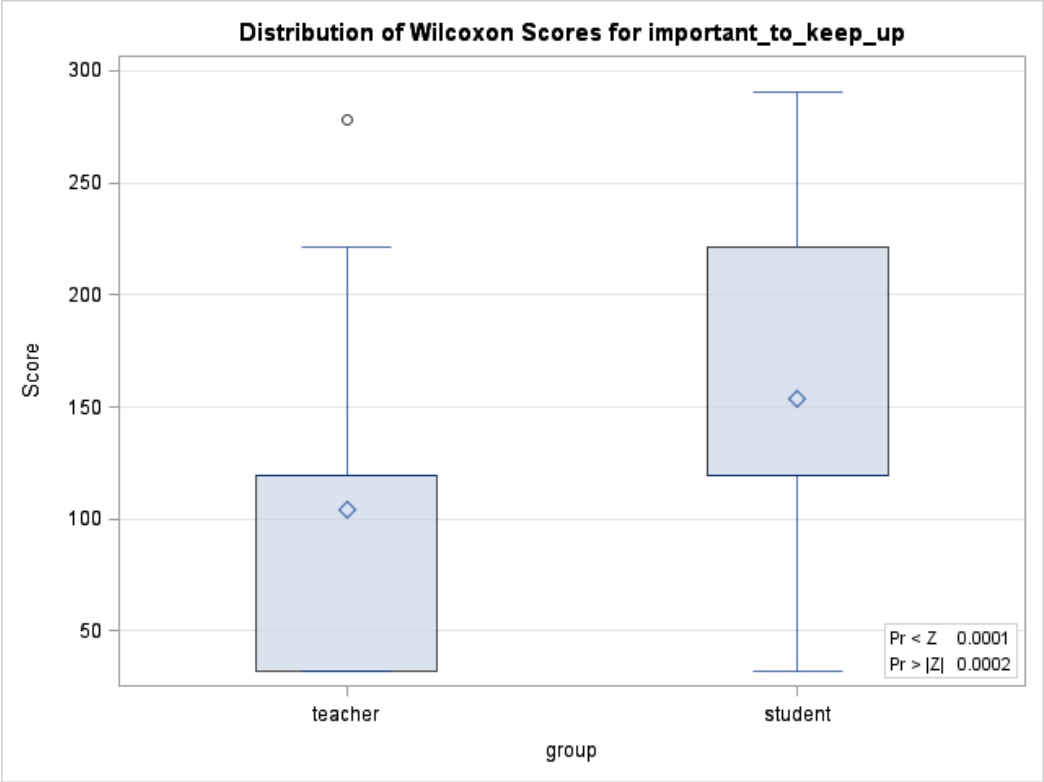

Figure 5. Distribution of Wilcoxon Scores for variable "Important to keep up with new trends in technology.

The mean ranking for the variables, "I feel technology makes people waste too much time" and "I feel new technology makes life more complicated" placed these variables lowest from both the teacher and student survey. However, similar to the previous three indicators, the Wilcoxon Two-Sample Test highlighted a statistically significant difference between the intensity of the teacher and student responses.

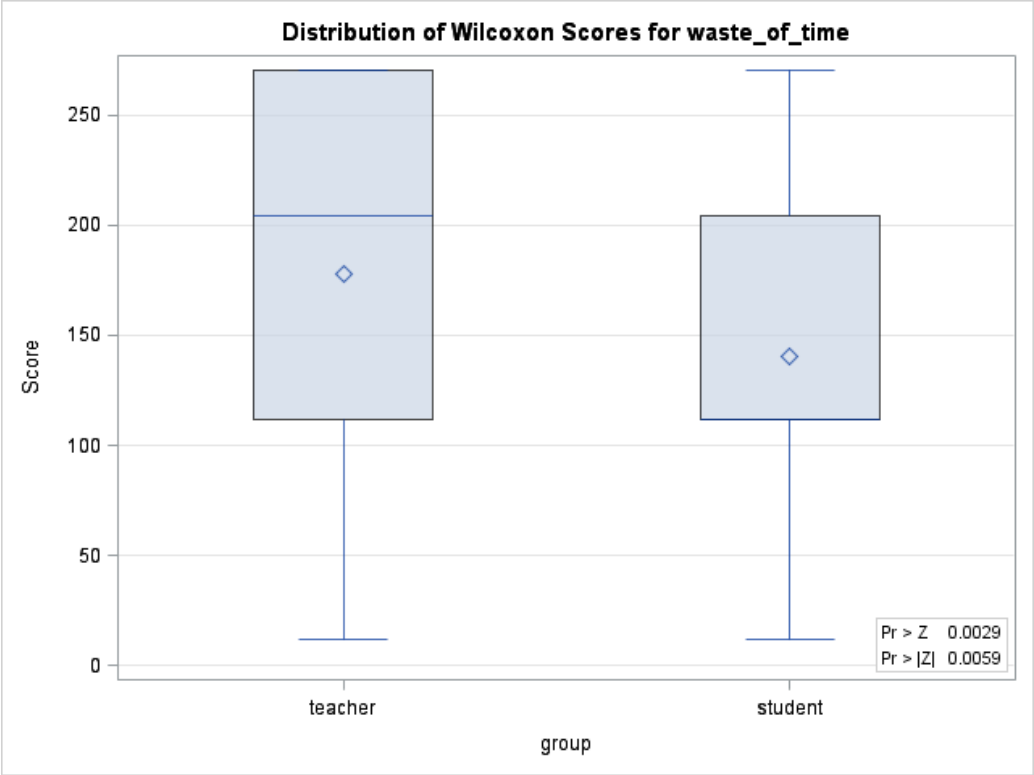

Figure 6. Distribution of Wilcoxon Scores for variable "New technology is a waste of time".

Figure 7. Distribution of Wilcoxon Scores for variable "New technology makes life more complicated".

A Pearson's correlation was run to determine the relationship between personal technology use and educational use variables for 7th and 10th grade students. The same test was run for middle and high teachers. Table 13 and Table 14 show the students' and teachers' Pearson's correlation for select personal technology use and educational use variables. Variables selected for analysis contain similar or transferable skill sets as identified by the researcher. Based on the assumption of skill crossover, preliminary analysis showed erratic and inconsistent relationships within in both groups.

Table 13
Correlation of Students' Personal Technology Use and Educational Use Variables

	Word Processing	Databases	Publishing	Presentation software	Drill / Practice	Tutorials	Programming Tools
Sending Email	.12	.15*	.17*	.21*	.08	.07	.12
Texting	.15*	.01	.14*	.03	.17*	.12	-.01
Making Phone calls	.09	.12	.10	.09	.17*	.06	.03
Web Browsing	.02	.06	.05	-.01	.23*	.33*	.13*
Listening to music	.68	.02	.08	.00	.11	.26*	-.01
Taking Pictures	.12*	.10	.27*	.14*	.16*	.14*	.14*
Using Apps	.21*	.06	.13*	.14*	.25*	.33*	.07
Posting on Facebook	.08	.24*	.01	.01	.20*	.14*	.16*

**Correlation is significant at $|p| < .01$*

Table 14
Correlation of Teachers' Personal Technology Use and Educational Use Variables

	Word Processing	Databases	Publishing	Presentation software	Drill / Practice	Tutorials	Programming Tools
Sending Email	-.08	.30*	.14	-.14	.20	.13	.10
Texting	-.23	.30*	.03	.02	.14	.24	.30
Making Phone calls	-.01	.30*	-.08	.08	.17	.45*	.40*
Web Browsing	-.17	.20	.05	-.07	.26	.15	.40*
Listening to music	-.15	.00	.04	.04	.36*	.16	.30
Taking Pictures	.01	.20	.09	.22	.08	.05	.10
Using Apps	.01	.20	.19	-.04	.34*	.10	-.10
Posting on Facebook	.09	.30	.21	-.01	-.03	-.15	.00

**Correlation is significant at $|p| < .01$*

A Pearson's correlation was run to determine the relationship between attitudes toward technology use and educational use variables for students and teachers. Table 15 and Table 16 show the Pearson's correlation for select attitudes toward technology use and educational use variables. The attitudinal variables selected for analysis were based on the mean score of the variable reported in this study. Preliminary analysis showed erratic and inconsistent relationships within in both groups.

Table 15
Correlation of Students' Attitudes toward Technology Use and Educational Use Variables

	Word Processing	Databases	Publishing	Presentation software	Drill / Practice	Tutorials	Programming Tools
Important to find info	-.12	.05	.00	.00	.02	-.09	.01
Important to access	-.14*	-.01	-.01	-.02	-.11	-.25	-.03
Important to keep up	-.10	-.07	-.12	-.08	-.10	-.10	-.08
Anxious w/o phone	-.02	-.03	.01	.14*	-.02	-.04	-.03
Anxious w/o internet	-.02	-.13*	-.02	.00	-.13*	-.11	-.13*
Technology solutions	-.09	-.13*	-.08	-.06	-.03	-.12	-.04
Technology possible	-.05	-.05	-.04	-.01	.00	-.09	.00

**Correlation is significant at $|p| < .01$*

Table 16
Correlation of Teachers' Attitudes toward Technology Use and Educational Use Variables

	Word Processing	Databases	Publishing	Presentation software	Drill / Practice	Tutorials	Programming Tools
Important to find info	-.08	-.01	.17	.10	.04	-.02	.07
Important to access	.01	-.10	-.02	.16	.03	.16	-.05
Important to keep up	-.24	-.15	-.29	-.33*	-.10	-.18	.17
Anxious w/o phone	.20	-.13	.09	-.06	.02	-.15	-.06
Anxious w/o internet	-.16	-.14	.02	-.10	.15	.17	.11

Technology solutions	-.43*	.00	-.05	-.18	-.07	-.13	.16
Technology possible	-.13	-.17	-.21	.03	-.04	.07	.05

**Correlation is significant at $|p| < .01$*

Focus Groups

As part of the school system's strategic plan, a one-to-one computing initiative was fully implemented three years prior to the study. Each student and teacher in 6th-12th grade received a MacBook Air assigned exclusively to the individual with the privilege to use the laptop at school and home. With the implementation of the countywide technology initiative, students and teachers have made substantial shifts in methods of both teaching and learning. The goal of the focus groups was to hear the perceptions of the technological practices directly from the students and teachers, adding depth and expanding the results of survey data.

It was important for the participants in the focus groups to freely express personal thoughts and opinions. To eliminate any potential power differential, students and teachers participated in separate focus groups. Focus groups were held at both the high school and middle school to support participation and alleviate the need for student and teacher travel. The focus group interviews addressed technology use for personal and educational purposes and the perceptions of how it has affected the learning and teaching environment. To ensure anonymity, each student and teacher was assigned a number indicated by T1 and S1.

The analysis of the focus groups revealed three major themes: self-efficacy, technology expectancy, and personal acceptance. The data were further coded into subcategories.

Table 17
Major Themes with Subcategories for Qualitative Analysis

Self-efficacy	Technology expectancy	Personal acceptance of technology
Need for training	Task-technology fit	Value in learning how to use
Students as resources	Access to hardware and Internet	Importance of engaging with technology
Barriers for use		Ease of use

Although the student and teacher focus groups were held independent of one another, similar themes emerged. Selected responses from the student focus groups are included and precede the teacher focus group responses.

Each student focus group began with a general discussion of personal technology use. A majority of students indicated they have smartphones and use them on a regular basis to communicate with friends and family. Several seventh grade students revealed that they are not allowed to get a phone until high school. With further prompting several students identified Instagram, SnapChat, and Facebook as several of the apps they use on their phones. Students indicated that they typically only used the school issued laptop for class assignments and relied heavily on the smartphone for personal use. Students also shared that the Information Technology Department at the individual schools is available for technical support with the hardware if they experience any difficulties but that students are responsible for lost or damaged hardware resulting from improper use.

Self-efficacy. In each focus group participants were asked to talk about how confident they feel about the technology they use in school and how they learned to use the specific technology tool. Student responses focused on two specific tools: personal

smartphones and the school issued MacBooks. Although the majority of students shared that they possessed a high level of confidence with using personal smartphones, many reported that learning the MacBook was difficult initially but that they gained skill and confidence quickly. Each student was assigned a unique identifying number to ensure anonymity of responses. The following quotes are representative of students' responses.

S3: "Macbook's got a lot of problems that I don't know how to do, because I'm not that technology-smart really when it comes to that. The iPhone is easier to work because you have it with you all the time and you're using it all the time to contact your parents or your friends or whatever."

S3: "It didn't really take that long [to learn]. Once you really figure out how it works, it comes really easily, but if you have trouble, it takes a while but once you actually get into a groove, then it's more easy to understand."

S4: "It's like second nature for me now. Yeah, like whenever we first got on, our teachers were confused too, so we kind of worked together to figure out what was going on but it kind of, you just kind of explore and figure it out yourself."

Although students acknowledged a learning curve for new technology, training was something the students identified as essential for teachers but not necessary for them as they felt that they could figure out most things on their own. Having continual access to their personal iPhones, authentic learning took place as needed to operate personal devices. As students continued to reflect on their overall confidence levels, the conversation turned to training and the need for teachers to become more knowledgeable. Additionally, students felt that teachers should acknowledge students' technology skills, using them as a resource for troubleshooting.

S7: “I think we need to have teachers learn a bit more because they're just going through basic training on iPads and just given their free time and that's all, but the problem is they don't have any free time, so they are trying to teach us what they know, but yet they know so little that they're basically just sending us off saying, ‘Hey, I don't have the time. You mess with it.’ They're having trouble with their stuff and they always call the IT department instead of just pulling a kid aside and just asking, ‘Hey, how do I do this or this?’ That's one of the problem that I've found as well.”

S3: “Kids tend to know more about technology than teachers. It's because we're around it all the time and we're using it all the time.”

The students in the focus groups were definitely who Prensky would identify as digital natives. Even so, the idea that younger students already know more about technology and how to use it intuitively than the focus group students reoccurred throughout the discussion. The perceived divide between student and teacher knowledge, as well as digital native and digital immigrant, was also present between students and younger students. When asked how younger children learned to use technology, the students suggested instinctive technology abilities.

S3: “This is really a technology age where kids who are like in elementary school, they know more about stuff than I did in elementary school, technology-wise. Back then, I used a pencil and paper.”

S4: “Yeah, my little brother got an iPod for Christmas and he's 4 and he knows how to work it better than I ever did.”

Teacher technology self-efficacy. Although the mean age within both teacher focus groups would suggest several participants could be considered digital immigrants,

throughout the conversation the teachers implied a sense of comfort and knowledge often associated with digital natives. Teachers in both focus groups expressed confidence in their ability to successfully integrate technology within daily lessons. However, the implication that other older teachers were fearful of technology entered the conversation periodically, perpetuating the popular belief of the digital native/immigrant divide. After an initial discussion on personal technology use, teachers were asked to talk about their interactions with technology and how they began using it in their teaching. The following quotes are representative of their responses.

T3: "I had went to a training one summer when we first got those, [netbooks] about project-based learning. We did a big thing, the Intel thing workshop that we did. Then we got the MacBooks,…. If you didn't go to the training, then you didn't get the training. Then they tried to supplement by doing our little faculty planning period lessons."

T5: "And they actually, our tech department from the county have made these [trainings] where they come during planning. I think we meet in two weeks, and we want to learn more about GarageBand next time they're here. They'll give us tutorials .... Like she said, the kids pick it up quick. It's harder for me to pick it up because I didn't have a computer until after I graduated college. I still used a typewriter…"

During the discussion of training, the teachers recognized student technology skills and implied a slight comfort level with receiving help from them. Although the teachers did not feel it diminished the student-teacher relationship, they appeared hesitant to use students as a technology resource in the classroom.

T4: "I think the students are really better [at technology than I am]. All I have to do is try something one time, and the kids pick it up, whereas a tech person has had to come to me, and show me how [to use the programs]. I've had to watch something or read instructions, and go through to learn how to do it within that. I had a technology [teacher] who shares a room with me this half semester, so she has shown me so many things within that. But, our tech people are willing to show us anything. If you have any problem, if you have a question or anything, they're always introducing stuff."

T4: "... They just automatically, it amazes me. Our sixth graders, you can hand this to them, and in two weeks they already [know] more than I will ever know about this".

While the teachers within the focus groups indicated substantial daily use of technology, describing their use of various activity tracking apps, Facebook, and other social media apps, there was a level of self-deprecation embedded within many responses. Additionally, even with a high level technology self-efficacy for personal use, teachers indicated the need for ongoing training to learn new programs, to practice troubleshooting skills, and to collaborate with teachers on new ways to meaningfully integrate technology into daily lessons.

Personal acceptance. Students all agreed that technology in education has added value by providing more opportunities to expand learning opportunities beyond traditional classroom instruction. When asked how they use the school assigned MacBook, students conveyed a sense of utility in its use.

S6: "You go home and be doing homework. Say you may have missed a day or something, it's make-up work or you never heard of the topic your homework's on.

Thanks to the MacBook, iPhone, you can just look it up and it's easier to understand. It will do the questions, that sort of stuff. Or if you don't have work or stuff, the MacBook iPhone, they can be just entertaining. Whatever you want to do."

S9: "…. I use it every day. In science today we were doing something about genetics. We had this book quest. We answered it on a pages document and then we turned it in on Haiku. It was all on the computer. It was really easy and a lot faster."

S3: "… you can find information, like if you don't understand something or don't understand a word, you can always go to Google, …And just Google it."

Although the students in the focus group indicated they enjoyed using technology for school as it made many aspects easier and more fun, the need for balance was a prevailing concern for the students. Several students acknowledged a feeling of disconnection because of the intrusion of technology into their personal lives and lack of tactile learning experiences in school.

S4: "People need social skills now. Like what happened to the good conversations where you'd sit down and like, it's changed so much."

S3: "Using your hands. Getting down and getting dirty. Just doing stuff like in Mr. Porter's class, I know, it's all about woodworking. I had that class and I loved it. Making stuff. It's an awesome class. I loved it."

S2: "I think there's like a balance."

The concept of acceptance of technology did not appear as salient for the students as idea of balance. These students view technology as a tool they use everyday in school as well as during recreational free time. Acceptance was implied and the value of the tool

came from an increase in accessibility to information, additional support from teachers and classmates, and increased communication between teachers, parents, and students.

Teacher perspective on personal acceptance. All teachers within the focus group expressed an above average quantity and frequency of personal technology use. Technology as an integrated part of everyday life is evident from the responses. Several teachers revealed the phone is the first thing they look at in the morning and the last thing they check at night. It is apparent that those teachers who indicated interest in participating in the focus group, returned the consent form, and showed up for the meeting were extremely connected and interested in technology use both personally and professionally.

T1: "…My personal use of technology begins in the morning because I obviously get on Facebook. I use the technology of my cell phone to check weather and … make sure my Fitbit is charged. As far as school is concerned, everything that I do is all computer-based. The classes that I teach, I teach Project Lead the Way … The students are using it. I'm using it to help them find websites. …Then it goes back to Facebook when I get off work."

T2: "My personal use is pretty similar to that. The first thing I do when I wake up in the morning is go on my phone, check weather, check to see if I have any emails or anything like that. Then the last thing I do of the day, is the exact same thing. Check all my information, my logs, Instagram, social medias, and all that stuff. I set my [alarm]. I use technology all day, every day. The same thing with the work-based technology. I'm using that all day long also especially engineering-wise. I'm always using different types

of technology, devices, meters of sorts, readers of some sort. [There's] is a huge [connection] between what I use like personal compared to work-based, always."

Due to the high level of personal technology use indicated, teachers were asked to discuss their reliance on technology for instruction and the degree to which technology may have altered their pedagogy. Unanimously, the group felt that their classes would not function without technology as not only had they had shifted how they approached the content of their subjects but they believed the students would be lost without technology as well. The following responses demonstrate the degree of the teachers' feelings.

T5: "You'd have to relearn what to do again. So much is on here. I keep saying I need to go back everything up, so I have copies of what I do in case something happens."

T4: "I also think that it would be catastrophic because that's what these kids know. They've grown up with it verses us. We didn't have these all the time, so we know what it was like. This is them. This is their world they live in, and I think for them it would be very bad as well. They wouldn't know how to survive …to be honest. That's how I feel."

The acceptance of technology for these teachers permeated both personal and professional use. The intensity of the responses indicated not only an acceptance but also reliance.

Technology expectancy. Technology acceptance models acknowledge multiple factors as motivators for technology use and acceptance. The alignment of task-technology fit and perceived usefulness of technology are two constructs within technology use and acceptance models. The overlap between technology acceptance and expectancy came to light when students expressed the utilitarian nature of technology.

The idea of technology as a tool led into a discussion about task-technology fit, using the right tool for the job.

S4: "We have this program called Haiku and it keeps all our grades and everything we do …up and running."

S6: "I always get my group to start up a Google doc, because we can all be on that at once and just be able to put down our information, talk about stuff on there. It's just easier to communicate the information and all of the sites that we're going to go through, instead of just the normal talking way. [With Google docs] just you're actually able to put down the site link that they went to. That way, you know if the site was good or not. You may have been to it, found out the information was false, they don't know. They can put down that information, put down the site and you can look at and let them know that's true, false, something like that. It can help out, because you'll actually know where they went, what they got exactly from it, all that."

The aspect of perceived usefulness as part of technology expectancy comingled with ease of use from the student perspective. Students expressed a high value in using technology as it made their work easier. The following responses exemplified two of the many ways students appreciated the usefulness of technology.

S10: "It's a lot easier than using textbooks. Sometimes we have to use textbooks in science and that's really hard to understand because everything is ... Everywhere. It's not organized like on a computer document would be, you can scroll through it. You can't scroll a book."

S12: “If it's a week long assignment where you keep adding things onto it, let's say you find a great website thing, you can easily bookmark in there and go back to it within seconds. If you have an actual textbook or something you would have to drag it out, look through the table of contents, remember what page you were on, all that sort of stuff. It takes much more time than being able to go to it in five seconds on my MAC book.”

Teacher perspective on technology expectancy. Task-technology fit as a construct plays an important role in Gu, Zhu, and Guo’s (2013) discussion of technology use and acceptance. Within the discussion, several teachers alluded to the importance of this construct. Similar to the responses of the students, teachers recognized technology as an important tool capable of enhancing instruction, assessment, and student learning.

T3: “It's a lot easier to assess their ability to speak the [foreign] language through the use of their computers. [And] it just gives them a new, creative outlet other than posters and worksheets.”

T5: “It also gives children that chance to demonstrate knowledge, ... especially EC kids. They struggle with certain academic things, but a lot of them are technology… savvy.”

Within the studied school system it is expected that teachers use technology to enhance student engagement, create collaborative learning environments, and increase students’ outcomes. Teachers indicated they are able to accomplish this expectation for students in the classroom. However, limited connectivity and access to the Internet throughout the county continues to impede full utilization of the technology available to

the students and teachers. Several teachers expressed their frustration and dismay at not being able to continue technology-enabled learning outside of school.

T3: “It's hard because a lot of students don't have connection at their own house. That's the biggest issue I've come across. … I have to deal with students that literally cannot get on the computers or can't check anything when they're home. They can't submit anything.”

T1: “It [Haiku] was originally designed to where we could, maybe not actually continue on, but would have access to some interaction with the students. We don't have that.”

The teachers discussed many of the ways they utilized technology, including skill and drill, creative production, and assessment. It was evident that similar to the students, the teachers embraced technology as a powerful tool. They reported not only increased student engagement but the teacher of exceptional children shared that many of her students gained confidence through the use of programs that provided students immediate feedback and an opportunity for self-reflection.

Chapter four has provided an examination of the results of the mixed methods research study and presented the findings in the form of descriptive statistics and narrative descriptions of student and teacher focus group interviews. The final chapter includes an analysis of the findings along with limitations, implications, and suggestions for future research.

Chapter Five

Conclusions

Technology has permeated all aspects of life, education being no exception (Lenhart et al., 2008). Furthermore, technology use is no longer limited to home, school, or work. The influx of mobile devices has created omnipresent computing, facilitating an increase in the time students and adults spend working with technology. In a Kaiser Family Foundation study, Riddout, Foehr, and Roberts (2010) reported that over the past five years students age 8-18 have increased the time spent involved with technology, averaging more than seven and half hours daily. Taking multitasking into consideration, students' daily interaction with some form of technology increased to over 10 hours and 45 minutes (Rideout, Foehr, & Roberts, 2010). Technology usage is increasing in other demographics as well. In less than one year, smartphone ownership and use has increased 6% among Americans over age 18 (Smith, 2015).

Technology is also ubiquitous in K-12 education (Fletcher, 2006). The National Education Technology Plan (NETP) put forward a model for education powered by technology (U.S. Department of Education, 2010). As technology has become an integral part of current national and local educational goals, it is necessary to understand the effects technology self-efficacy and personal engagement has on attitudes toward technology use in education. Guided by the following research questions, this study asserts that technology self-efficacy, along with personal acceptance and use of technology, is necessary for students and teachers:

1. To what degree do students' and teachers' technology self-efficacy and personal technology usage affect the use of technology for educational purposes?

2. What are students' perceptions of specific technological practices used in the classroom?
3. What technology tools (both hardware and web tools) do students and teachers use and how frequently do they use them?
4. How does personal technology use correlate with educational technology use?

The findings of this study were informed by statistical survey data and the themes that emerged from student and teacher input during focus groups. Within this chapter, findings were merged to capitalize on the strength of the sequential explanatory mixed methods design utilized for this study. In addition to an analysis of the findings, Chapter five addresses previously identified gaps in the literature, limitations of the study, implications of the study, and within the final section of the chapter, answers to unasked questions lay the groundwork for the recommendations for further research.

Analysis

Relationship between technology self-efficacy and attitudes toward use. Based on the studied school system's (ACS) mission to "have every student graduate from high school globally prepared for life in the 21st century" (as listed the school's website), the strategic plan included multiple goals involving technology. To achieve these goals, the school system aggressively began to address the effective implementation of technology in 2011 through a one-to-one technology initiative. Providing all students and teachers exclusive access to technology hardware addressed issues of inequity and laid the foundation for meaningful integration of technology in the classroom. Additionally, over the past several years, ACS has provided ongoing technology professional development for faculty to support technology integration. Highlighting the

importance of quality instruction that promotes personal interest as well as technical skills, Bandura (1997) stated, "teaching that instills a liking for what is taught fosters self-initiated leaning long after the instruction has ceased" (p. 219). It was apparent when the researcher visited each school that interest in technology, as well as self-initiated learning for both students and teachers, was present.

The culture within each of the site schools was one of support, acceptance, and willingness to integrate technology into all aspects of instruction. Student 4's comment stating that engaging with technology had become second nature captured the overall sentiment of student acceptance and was echoed by teachers in both focus groups. Although technology has become second nature to most, when the laptops and iPads were first introduced at school, both teachers and students struggled learning how to use the devices within the curriculum. But by working together they were successful with the new technology, conveying a sense of combined confidence in adopting the new devices and applications. Several teachers expressed a belief that students were fearless when using technology, denoting a sense of admiration for their students. This culture of mutual acknowledgment of technology skills has enhanced the continued acceptance and use of technology by both students and teachers.

Items on the composite survey measuring self-efficacy supported this finding. Teachers' mean score of 1.85, with 1 denoting strongest agreement and 5 denoting strongest disagreement, indicated a high level of confidence in effectively using technology in daily instruction. Interestingly, within the high school teacher focus group, there was a collective belief that they would be "lost" without the use of technology. Due to the infusion of technology within the past several years, they have dramatically shifted

their pedagogies to a degree that they could not see teaching without it. Not only did they see the value of its use for instructional purposes, they continually emphasized the myriad of student learning outcomes made possible through technology. Hedberg (2011) describes this pedagogical shift due to technologies as disruptive innovation, "the combined use of the interactive whiteboard and digital content has the potential to develop into a disruptive innovation, as each of these digital technologies changes how ideas are represented and how concepts can be presented and shared…" (p. 2).

Student responses also indicated a high level of self-efficacy when using technology. Eighty percent of student respondents indicated a strong agreement with the statement, "I usually do well with technology" demonstrated by a mean score of 1.98. When discussing why technology allows them to achieve proficiency, ease of use emerged as a common theme. Students discussed the ease of navigating through online documents compared to the "clunkiness" of textbooks, exuding confidence in their abilities to use technology effectively. The distribution of scores for both teachers and students demonstrated a similar degree of self-efficacy as 28% of respondents in both groups indicated strong agreement with the survey item representing the construct of self-efficacy.

Results from survey items measuring attitudes towards technology revealed a positive attitude within both the teacher and student groups. Although the mean score for both groups varied slightly, both indicated agreement to the importance of being able to find information online whenever they wanted it, as well as the importance of being able to access the Internet any time. Additionally, a mean score of 2.38 and 2.44 on the statement that "technology will provide solutions to many of our problems," reflected

both teachers' and students' positive attitude toward technology. This positive attitude toward technology was evident within each focus group. However, several students mentioned the need to balance lessons containing technology with those that are more hands-on. For example, Student 7 made the point that school is not about technology; it is learning that matters. "I feel like if I put effort into paper or technology, I feel like I will be proud of myself either way if I felt like I did good" (Student 7).

Independently, technology self-efficacy and attitudes toward technology use are important factors in acceptance and use of technology. Identifying the relationship between the two factors was an important component of this study. Through the use of Pearson's correlation, moderate and strong positive correlations were evident. Within the student group, a statistically significant relationship was found between all self-efficacy and attitude variables except "new technology makes people more isolated" and "I usually do well with technology." This relationship appears to be an outlier as the variable "new technology makes people more isolated" was statistically significant with the remaining four self-efficacy variables measured. Aside from the previous exception, a moderate to strong positive correlation between all students' technology self-efficacy and attitude toward technology variables exists with correlation coefficients, *r*-values of $.3<|r|<.5$.

Although statistically significant positive correlations between attitude toward technology and technology self-efficacy factors were evident for teacher respondents, the strength and significance level varied from that of students. Wilcoxon Two-Sample tests run on common variables in student and teacher surveys supported this finding.

Teacher and student perceptions of technological practices. Preliminary focus group questions were designed based on the results of the survey; however, the discussions often provided a nuanced explanation of the survey findings, creating greater understanding. Survey results revealed that respondents found "new technology makes people waste too much time" but at the same time felt that they "get more accomplished because of technology." Initially, this response seemed incongruent. Further questioning within the focus groups revealed that students and teachers alike recognized that although social media sites kept them connected with friends and family, they could often get sidetracked, becoming distracted from the work at hand for several hours. This connection to social media was apparent within both groups, and although several teachers acknowledged social media could waste a great deal of time, they felt the need to begin and end each day by checking Facebook, Instagram, and other social media sites.

Pinterest was another site that teachers identified as both extremely helpful and a site that could distract them from staying on task. One teacher went so far as to say she wasn't sure how teachers ever taught without it, but at the same time, she often spent too many hours just browsing ideas. The angst brought on by the dichotomy of technology's helpfulness along with its distraction, felt by the students and teachers, became obvious as the discussion continued. Technology was clearly viewed as beneficial; however, out of this discussion emerged the need for balance when engaging with technology.

The need for balance was also evident within the student groups. Tenth grade students eagerly discussed their personal use of technology as a tool for communication and its constant place in their lives. Students emphasized they used phones to text, send pictures, and chat with friends outside of school. They implied that technology in school

was beneficial for learning and communicating with teachers, but were quick to acknowledge their desire for more classes that required use of hands-on materials. These students see technology as omnipresent and a permanent part of their educational landscape. Although the students were relatively young, the discussion took a nostalgic turn with several students expressing a longing for deeper face-to-face communication with family and friends. The idea of exchanging immediacy for intimacy was troubling for group members (Turkle, 2011). However, when asked what might happen if all technology in their schools and lives went away tomorrow, students and teachers alike stated they would be lost. This incongruence between acceptance, use, and desire for balance is an area for future research.

Connection between personal and educational technology use. Engagement with technology continues to grow: "88% of American teens ages 13 to 17 have or have access to a mobile phone of some kind, and a majority of teens (73%) have smartphones" (Lenhart, 2015, p. 8). Within the past two years, access to mobile technology increased by 10% and smartphone ownership went up by 36%. This increase in personal use creates potential for greater pedagogical disruption through innovative use of technology for content delivery and knowledge construction, creating shared control between teacher and student (Hedberg, 2011).

Based on the assumption that technology skills developed for personal use should transfer to educational applications, a Pearson's correlation was run to investigate the strength and relationship of personal technology use and educational use variables. Although the results indicated several moderately strong significant relationships, the connection between variables was unclear. An example of incongruent findings within

the teacher results was the strong positive correlation between "listening to music" and "use word processing for school related activities", $r = .68$, $p < .01$. Similarly, the lack of correlation between "sending emails" and use of "word processing", $r = -.08$, contradicted the assumption that possession of specific personal technology skills would lead to application of the same skills for educational purposes. These findings brought to the forefront the need for additional investigation of transference of personal technology skills to educational settings.

To examine the strength and relationship of attitudes toward technology use and actual utilization of technology applications in educational settings, another Pearson's correlation was run. Many of the variables indicated weak negative correlations, with several showing no relationship at all. The most outstanding result was the moderate negative correlation between the use of presentation software and the belief that technology will provide solutions to many problems. Similar to the results of the previous test, the findings raised multiple questions, precipitating the need for further exploration within the focus groups. Ultimately, it was discovered that computer applications were only used in school in response to specific assignments, so the belief that technology would provide solutions to problems was irrelevant. Until there is a greater shared control of pedagogy and knowledge creation between student and teacher, technology usage will remain influenced by teacher usage, beliefs, and attitudes.

Furthering this assumption was the correlational results showing mostly non-existent to weak negative correlations between attitudes toward technology use and actual use of technology for educational purposes. Students demonstrated a positive attitude toward technology as a part of their everyday lives during discussions. The survey and

focus group results found that technology is perceived as a necessary tool, making life easier in and out of school. Along with this positive attitude and acceptance of technology, students, once again, acknowledged their use of technology at school was directly dictated by the assignments given.

Teachers also demonstrated a positive attitude toward technology as well as a high frequency of personal use. However there exists a slight disconnect between these factors and meaningful integration of technology in the classroom. Although teachers previously indicated a gradual pedagogical shift, there remained a need and desire for additional training. It is not enough to have the technology tools and just incorporate them into the existing practice of teacher-directed instruction. As products of an education system themselves, teachers may unknowingly carry with them a folk pedagogy of ingrained educational practices (Belland, 2009). Described as Bourdieu's theory of habitus, these durable, long lasting attitudes, behaviors, and responses applied within any given situation may affect a teacher's ability to adopt new teaching methods (Webb et al., 2002). To offset habitus or the reliance on folk pedagogies, there is a need for continued training on meaningful technology integration (Belland, 2009; Hammonds et al., 2013). Although the teachers within this study exhibited confidence in using technology for personal use along with basic knowledge of integrating technology in the classroom, each identified the need for modeling of best practices for technology use.

Addressing the Gaps

Much of the research on technology integration has examined school and teacher level barriers. Studies identified teacher confidence, academic self-efficacy, and technical efficacy as barriers to meaningful technology integration (Chen, 2008; Ertmer et al.,

2012; Ertmer & Ottenbreit-Leftwich, 2013; Hammonds, et al., 2013). Missing from the literature were student perceptions and barriers to meaningful use of technology for educational purposes. This study added student technology self-efficacy data, as well as student attitudes and beliefs data regarding personal and educational technology usage.

Limitations

Although the findings of this study are robust, several limitations exist. First, the county studied is a small rural county with a homogeneous population. With approximately 2130 students enrolled in the county school system, the size of the district restricted the number of teacher and students available to participate in the study. Narrowing the sample size further was the decision to only include 7th and 10th grade students as well as only middle and high school teachers. Additionally, although Internet access is limited within the county due its rural nature, the integration of technology is central in the school system's strategic plan. To achieve their strategic technology plan, the county commissioners and school board have worked together to provide Internet access and one-to-one technology for all students while in school. Elementary schools are now outfitted with iPads for use in school while middle and high school students are supplied with a laptop for exclusive use at home and school. Teachers in the district are also currently issued a laptop and have access to professional development surrounding technology integration. This commitment to technology integration may not reflect other rural counties.

Secondly, while the teacher focus groups reflected the overall racial and gender demographics of the teacher population all participants expressed a positive connection with technology. Additionally, with the high level of commitment and support

surrounding technology integration, the participants within this study could possess a greater level of comfort with technology than those in other school settings. Although members in the student and teacher focus groups were selected from the pool of possible survey respondents, participants had to express interest in joining the focus group by returning the consent form. The low return rate of consent forms led to participants ultimately self-selecting for inclusion within the focus groups. Self-selection brings committed participants but also can intensify the results (Creswell, 2008; Morgan, 2014).

Finally, all surveys were delivered electronically. Although the studied school system has implemented one-to-one computing, there may still be students and teachers who are not comfortable interacting with a survey completely online. Both the delivery and the content of the survey implied a positive connection with technology. This underlying assumption of preexisting technology skills could have precluded some individuals from participating in the survey.

Revisiting the Conceptual Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) as the conceptual framework for this study established a suitable starting point for consideration of the topic. Merging Gu, Zhu, and Guo's constructs with Venkatesh, Morris, Davis, and Davis' UTAUT provided a broader structure with multiple perspectives of the constructs under review. Although the UTAUT identified self-efficacy and attitudes toward technology use as moderated factors, the findings in this study highlighted the significance of technology self-efficacy and attitudes toward use as important components for technology use and acceptance in the classroom.

Implications of this Study

Previous studies have considered teacher self-efficacy, technology use, and attitudes towards technology separately (Davis, 1989; Etmer et al., 2012; Gokcek et al., 2013; Gu et al., 2013; Holden & Rada, 2011; Inan & Lowther, 2010; Kim et al., 2013; Niederhauser & Perkmen, 2008). This study investigated the relationship between these constructs and how it affects the integration of technology in the classroom.

Implications for Administrators. Moving beyond the basics of how to use devices and applications while building on Pajares' (1992) belief that knowledge ultimately influences teachers' content decisions, professional development designed to weave content, pedagogy, and technology will greatly expand teachers' ability to utilize current technology to its fullest extent. While the teachers in this study commended the current administration for the technology training provided, they were insistent that the changing nature of technology precipitates the need for continual and embedded professional development. Embedded professional development should support teachers in the classroom, in real time, centered on actual practice. Administrators should support a professional culture that fosters continuous learning. Through redesigning traditional professional development in ways that recognize technology as more than a new vehicle for teacher-directed content delivery, technology can become a disruptive innovation opening the door to new and expanded ways of teaching and learning.

Although Tapscott (1998) and Prensky (2001) assert that all students born in the net-generation are digital natives, many students within this study revealed only basic use of the technology afforded to them. The assumptions that all students possess an innate knowledge of technology can limit student achievement. Providing adequate technology

tools is one of the critical steps necessary if students are to succeed. However tools alone do not ensure success. Administrators should consider providing additional technology training for students, perhaps following the model of teacher professional learning communities. Increasing student technology self-efficacy may directly increase student use and indirectly increase student achievement.

Implications for Teachers and Students. Teachers in this study identified a shifting of their educational practices. The redesigning of teaching methods will be necessary to move from what Dede (2007) described as a "means of increasing the effectiveness of traditional instructional approaches" to that of meaningful technology integration. Dede (2007) further expressed that the full potential of technology has not been reached. For this pedagogical shift to occur and the benefits of technology to be realized, teachers must be aware of folk pedagogies they bring into the classroom and share a willingness to expand their understanding of 21st century teaching and learning concepts.

Acknowledging the technology skills that many of the students bring to the classroom can foster a collaborative environment where students become partners in acquiring new technology skills and creating new understandings. This sharing of skills and collaboration can become a catalyst for learning. Ultimately the collaboration between students and teachers may create greater student success and increased achievement as the power of educational technology is realized.

Teachers and students in this study identified the infusion of technology as a means to support new methods of instruction. Although technology has made many assignments easier to complete through the ease of word processing or Internet access for

research, students were acutely aware of the need for balance between technology usage and more traditional classroom instruction. This desire for balanced instruction highlights the complexities and the subtleties of being formally educated during a time of rapid transformation within the educational landscape. Changes in how technology is used, along with the increasing access to emerging technologies, have created the need for pedagogical redesign.

Recommendations for Future Research

Out of this study emerged several opportunities for future research. First, the findings of this study emphasized that although students and teachers confidently engaged with technology both in and out of school, the desire for balanced instruction was present. Examining pedagogical practices that address the desire to engage with technology while maintaining a connection with authentic hands-on learning could potentially increase the impact of integrated technology.

Secondly, the findings also implied the need for meaningful ongoing professional development. Students indicated that the use of technology in school was often limited by the curriculum or the assignment. Teachers were also aware of these constraints and requested training on specific lessons integrating technology. Future research connecting the utilization of professional learning communities, teacher technology self-efficacy, and authentic technology integration may provide valuable tools for school and district level leaders.

Finally, as this study examined the attitudes of teachers and students in a small rural county, replicating the study within a larger urban school system would increase the generalizability of the study.

Conclusion

The findings in this study support the prevailing literature. Teacher technology efficacy and personal engagement play a critical role in shaping attitudes toward technology use in education (Padmavathi, 2013). Teachers bring to the classroom a predetermined set of folk pedagogies and teaching habitus that must be addressed in order to successfully integrate technology into the curriculum (Belland, 2009; Hammonds et al., 2013). For these pedagogies to be dislodged and replaced with decentralized authority and a more collaborative learning environment, professional development will have to move beyond the traditional professional learning communities. The professional development must become continually and embedded into the workday. Focus must be placed on current curriculum and tied to specific classroom needs. Including students in this on-going training could further the collaborative culture within the school.

Technology is a powerful tool with the ability to change the educational landscape. The key for educators is to maximize the power to support a pedagogical shift. Creating technology-driven instruction is not the ultimate goal. Rather, creating instructional environments supported with technology and driven by students and teachers in collaboration to increase student learning will help realize the full potential of technology in education.

References

Avery County Schools. (2012). Retrieved from http://www.averyschools.net/domain/47

Avery County Schools. (2013). In *Wikipedia.* Retrieved from http://en.wikipedia.org/wiki/Avery_County_Schools

Avery County Schools (n.d.). *Mission and Vision / Overview*. Retrieved from http://www.averyschools.net/domain/48

Bandura, A. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes, 38,* 92-113.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148.

Bandura, A. (1997). *Self efficacy; The exercise of control.* New York: W.H. Freeman and Company.

Belland, B. R. (2009). Using the theory of habitus to move beyond the study of barriers to technology integration. *Computers & Education*, *52*, 353-364.

Bennett, S. (2012). Digital natives. In Z. Yan (Eds.), *Encyclopedia of cyber behavior*, 1, (pp. 212-219). United States: IGI Global. Retrieved from http://ro.uow.edu.au/cgi/viewcontent.cgi?article=2364&context=edupapers&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fhl%3Den%26q%3Dthe%2Brole%2Bof%2Btechnology%2Bin%2Btoday%2527s%2Bstudent%2Bs%26btnG%3D%26as_sdt%3D1%252C34%26as_sdtp%3D#search=%22role%20technology%20todays%20student%20s%22

Bennett, S., & Maton, K. (2010). Beyond the 'digital natives' debate: Toward a more nuanced understanding of students' technology experiences. *Journal of Computer Assisted Learning*, *26*, 321-331.

Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: A critical review of the evidence. *British Journal of Educational Technology*, *39*(5), 775-786.

Berliner, D. (2002). Comment: Education research: The hardest science of all. *Educational Researcher*, *31*(8), 18-20. DOI: 10.3102/0013189X031008018

Blair, N. (2012). Technology integration for the new 21st century learner. *Principal*, Jan/Feb, 8-13.

Brenneman, R. (2014, June 18). Before buying technology, asking 'why?' *Education Week Teacher.* Retrieved from http://www.edweek.org/tm/articles/2014/06/18/gp-definitions.html

Brophy, J. (2004). *Motivating students to learn*. Mahwah, NJ: Lawrence Erlbaum Associates.

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

Cameron, R. (2009). A sequential mixed model research design: Design, analytical and display issues. *International Journal of Multiple Reseach Approaches, 3*, 140-152.

Caruth. G. D. (2013). Demystifying mixed methods research design: A review of the literature. *Mevlana International Journal of Education*, *3*(2), 112-122.

Chen, C. (2008). Why do teachers not practice what they believe regarding technology integration? *Journal of Educational Research*, *102*(1), 65-75.

Ciampa, K. (2014). Learning in a mobile age: An investigation of student motivation. *Journal of Computer Assisted Learning*, *30*, 82-96.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Creswell, J.W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Boston, MA: Pearson.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*, 319-340.

Davis, F. D., Bagozzi, R., Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982-1003.

Dede, C. (2007). Reinventing the role of information and communications technologies in education. *Yearbook of the National Society for the Study of Education*, *106*(2), 11-38.

Diemer, T. T., Fernandez, E., & Streepey, J. W. (2012). Student perceptions of classroom engagement and learning using iPads. *Journal of Teaching and Learning with Technology*, *1*(2), 13-25.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers & Education*, *64*, 175-182.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, *59*, 423-435.

Feistritzer, C. E. (2011). *Profile of teachers in the U.S. 2011*. Washington, DC: National

Center for Education Information.

Fink, A. (2013). *How to conduct surveys: A step-by-step guide* (5th ed.). Los Angeles: Sage.

Fletcher, D. (2006). Technology integration: Do they or don't they? A self-report survey from PreK through 5th grade professional educators. *AACE Journal, 14*(3), 207-219.

Glesne, C. (2011). *Becoming a qualitative researcher: An introduction*. Boston: Pearson.

Gokcek, T, Gunes, G., & Gencturk, E. (2013). Evaluation of primary school teachers' technological self-efficacy. *International Online Journal of Educational Sciences*, *5*(1), 42-51.

Gorder, L. M. (2008). A study of teacher perceptions of instructional technology integration in the classroom. *The Delta Pi Epsilon Journal*, *L*(2), 63-76.

Greene, J. C. (2007). *Mixed Methods in Social Inquiry*. San Francisco: Jossey-Bass.

Greene, J. C., Kreider, H., & Mayer, E. (2011). Combining qualitative and quantitative methods in social inquiry. In B. Somekh & C. Lewin (Eds.), *Theory and methods in social research* (pp. 259-266). Los Angeles: Sage.

Gu, X., Zhu, Y., & Guo, X. (2013). Meeting the "Digital Natives": Understanding the acceptance of technology in classrooms. *Educational Technology & Society*, *16*(1), 392-402.

Guo, Z., Li, Y., & Stevens, K. J. (2012). Analyzing students' technology use motivations: An interpretive structural modeling approach. *Communications of the Association for Information Systems, 30*(14), 199-224.

Harmes, C., Kemker, K., Kalaydjian, K., & Barron, A. E. (2000, November). *Working*

toward national technology standards: Teacher use of computers in the classroom. Paper presented at the Florida Educational Research Association, Tallahassee, Florida.

Hammonds, L., Matherson, L. H., Wilson, E. L., & Wright, V. H. (2013). Gateway tools: Five tools to allow teachers to overcome barriers to technology integration. *The Delta Kappa Gamma Bulletin*, *80*(1), 36-40.

Hedberg, J. G. (2011). Towards a disruptive pedagogy: changing classroom practice with technologies and digital content. *Educational Media International*, *1*, 1-16.

Hogarty, K., & Kromrey, J. (2000, November). *The nature of technology use in classrooms: The development and validation of an instrument to measure teachers' perceptions*. Paper presented at the Florida Educational Research Association, Tallahassee, Florida.

Holden, H., & Rada, R. (2011). Understanding the influence of perceived usability and technology self-efficacy and teachers' technology acceptance. *Journal of Research on Technology in Education*, *43*(4), 343-366.

Inan, F. A., & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: a path model. *Education Technology Research and Development*, *58*, 137–154. DOI 10.1007/s11423-009-9132-y

ISTE. (n.d.). *ISTE Standards/Teachers* Retrieved from http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-T_PDF.pdf

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, *33*(7), 14-26.

Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratification research. *The*

Public Opinion Quarterly, *37*(4), 509-523.

Kennedy, G., Judd, T., Dalgarnot, B., & Waycott, J. (2010). Beyond natives and immigrants: Exploring types of net generation students. *Journal of Computer Assisted Learning*, *26*, 332-343.

Kim, C. M., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76-85.

Kleiner, B., Thomas, N., & Lewis, L. (2007). *Educational technology in teacher education programs for initial licensure*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Koehler, M., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK). *Journal of Education*, *193*(3), 13-19.

Kolikant, Y. B-D. (2010). Digital natives, better learners? Students' beliefs about how the Internet influenced their ability to learn. *Computers in Human Behavior*, *26*, 1384-1391.

Lee, D. Y., & Lehto, M. R. (2013). User acceptance of YouTube for procedural learning: An extension of the Technology Acceptance Model. *Computers & Education*, *61*, 193-208.

Lee, M. K. O., Cheung, C. M. K., & Chen, Z. (2005). Acceptance of internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, *42*, 1095-1104.

Lenhart, A. (2015). *Teens, social media and technology overview 2015.* Washington, DC: Pew Research Center.

Lenhart, A., Arafeh, S., Smith, A., & MacGill, A. (2008). *The lives of teens and their technology.* Pew Research Center, Washington, DC. Retrieved from http://www.pewinternet.org/2008/04/24/the-lives-of-teens-and-their-technology/

Liou, P-Y, & Kuo, P-J. (2014). Validation of an instrument to measure students' motivation and self-regulation towards technology learning. *Research in Science & Technology Education*, *32*(2), 79-96.

Liu, Y., & Huang, C. (2005). Concerns of teachers about technology integration in the USA. *European Journal of Teacher Education, 28*(1), 35-47.

Lorenzo, G., Oblinger, D., & Dziuban, C. (2007). How choice, co-creation, and culture are changing what it means to be net savvy. *EDUCAUSE Quarterly*, *30*(1), 6-12.

Madden, M., Lenhart, A., Cortesi, S., Gasser, U., Duggan, M., Smith, A., & Beaton, M. (2013). Teens, social media, and privacy: Part 1, Teens, and social media use. *Pew Internet & American life project*. Retrieved from http://www.pewinternet.org/2013/05/21/part-1-teens-and-social-media-use/

Madden, M., Lenhart, A., Duggan, M. Cortesi, S., & Gasser, U. (2013). Teens, social media, and privacy. *Pew Internet & American Life Project*. Retrieved from http://www.pewinternet.org/2013/03/13/teens-and-technology-2013/

Maehr, M., & Meyer, H. A. (1997). Understanding motivation and schooling: Where we've been, where we are, and where we need to go. *Educational Psychology Review*, *9*(4), 371-409.

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic

motivations for learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction: Volume 3. Conative and affective process analyses* (pp. 223 – 253). Hillsdale, NJ: Erlbaum.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370 396. http://dx.doi.org/10.1037/h0054346

Maxwell, J. A. (2013). *Qualitative Research Design: An Interactive Approach* (3rd ed.). Los Angeles: Sage.

Morgan, D. L. (2014). *Integrating Qualitative and Quantitative Methods: A Pragmatic Approach.* Los Angeles: Sage.

Niederhauser, D. S., & Perkmen, S. (2008). Validation of the intrapersonal technology integration scale: Assessing the influence of intrapersonal factors that influence technology integration. *Computers in the School*, *25*(1-2), 98-111.

Oblinger, D., & Oblinger, J. (2005). Is it age or IT: First steps to understanding the ne generation. In D. Oblinger, & J. Oblinger, (Eds.), *Educating the net generation* (1*)*. Retrieved from www.educause.edu/educatingthenetgen/

Onwuegbuzie, A. (2012). Introduction: Putting the MIXED back into quantitative and qualitative research in educational research and beyond: Moving toward the radical middle. *International Journal of Multiple Research Approaches*, *6*(3), 192-219. doi:10.5172/mra.2012.6.3.192

Padmavathi, M. (2013). An overview of barriers in technology integration schools and their interrelationships. *Indian Streams Research Journal*, 3(9), 1-7. Retrieved from www.isrj.org

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy

construct. *Review of Educational Research*, *62*(3), 307-332.

Mobile Technology Fact Sheet. (2014). In *Pew Research Center, Internet, science, & tech*. Retrieved from http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, *9*(5), 1-6.

Purcell, K., Buchanan, J., & Friedrich, L. (2013). *Teachers see digital tools affecting student writing in myriad ways*. Washington, DC: Pew Research Center.

Purcell, K., Heaps, A., Buchanan, J., & Friedrich, L. (2013). *How teachers are using technology at home and in their classrooms*. Washington, DC: Pew Research Center. Retrieved from. http://www.pewinternet.org/2013/02/28/how-teachers-are-using-technology-at-home-and-in-their-classrooms/

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M2: Media in the lives of 8- to 18- year-olds*. Kaiser Family Foundation. Retrieved from http://www.kff.org/entmedia/mh012010pkg.cfm, accessed online 8/03/14

Ritzhaupt, A., Dawson, K., & Cavanaugh, C. (2012). An investigation of factors influencing student use of technology in K-12 classrooms using path analysis. *Journal of Educational Computing Research*, *46*(3), 229-254.

Rosen, L. D. (2010). *Rewired*. New York: Palgrave MacMillan.

Rosen, L. D., Whaling, K., Carrier, L. M., Cheever, N. A., & Rokkum, J. (2013). The media and technology usage and attitudes scale: An empirical investigation. *Computers in Human Behavior*, *29*, 2501-2511.

Russell, M., Bebell, D., & O'Dwyer, L. M. (2005). Tracking the arc of new teachers'

technology use. In C. Vrasidas & G.V. Glass (Eds.), *Preparing teachers to teach with technology* (pp. 45-63). Greenwich: Information Age Publishing.

Sanchez, A. R., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computers in Human Behavior*, *26*, 1632-1640.

Sanchez, A., Cortijo, V., & Javed, U. (2014). Students' perceptions of Facebook for academic purposes. *Computers & Education*, *70*, 138-149.

Schram, T. H. (2006). *Conceptualizing and proposing qualitative research*. Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4-14.

Smith, A. (2015). The smartphone difference. *Pew Research Center*. Retrieved from http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/

Smith, R. E., Sarason, I. G., & Sarason, B. R. (1982). *Psychology: The frontiers of behavior*. New York: Harper & Row.

Somekh, B., Burman, E., Delamont, S., Meyer, J., Payne, M., & Thorpe, R. (2011). Research in the social sciences. In B. Somekh and C. Lewin (Eds.), *Theory and methods in social research* (pp. 2-15). Los Angeles: Sage.

Spires, H. A., Lee, J. K., & Turner, K. A. (2008). Having our say: Middle grade student perspective on school, technologies, and academic engagement. *Journal of Research on Technology in Education, 40*(4), 497-515.

Steel, P., & Konig, C. J. (2006). Integrating theories of motivation. *Academy of Management Review, 31*(4), 889-913.

Stewart, J., Antonenko, P., Robinson, J. S., & Mwavita, M. (2013). Intrapersonal factors affecting technological content knowledge of agricultural education teachers. *Journal of Agricultural Education*, *54*(3), 157-170.

Tapscott , D. (1998). *Growing up digital*. New York: McGraw-Hill.

Tapscott , D. (2008). *Grown up digital*. New York: McGraw-Hill.

Teo, T. S. H., Lim, V. K. G., & Lai, R. Y. C. (1999). Intrinsic and extrinsic motivation in Internet usage. *Omega, 27*, 25-37.

The Partnership for 21st Century Skills. (n.d.). *Framework for 21st century learning.* Retrieved from http://www.p21.org/our-work/p21-framework

Thomas, D., & Brown, J. S. (2011). *A new culture of learning: Cultivating the imagination for a world of constant change* (219). Lexington, KY: CreateSpace.

Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. *Computers &Education*, *65*, 12-33.

Trochim, W. M. (2006). The Research Methods Knowledge Base, 2nd Edition. Retrived from http://socialresearchmethods.net/kb/

Tryphon, A., & Voneche, J. (Eds.). (1996). *Piaget – Vygotsky: The social genesis of thought.* New York: Psychology Press, Taylor & Francis Group.

Tuan, H-L., Chin, C-C. & Shieh, S-H. (2005). The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education*, *27*(6), 639-654.

Turkle, S. (2011). The tethered self: Technology reinvents intimacy and solitude. *Continuing Higher Education Review*, *75*, 28-31.

Turkle, S., & Papert, S. (1991). Epistemological pluralism and the revaluation of the

concrete. Retrieved from http://web.mit.edu/sturkle/www/pdfsforstwebpage/ST_Epistemo%20Pluralism.pdf

U.S. Census Bureau. (n.d.). *State and County QuickFacts.* In Census.gov. Retrieved from http://quickfacts.census.gov/qfd/states/37/37011.html

U.S. Census Bureau. (2012). *Computer and Internet Trends in America*, Retrieved from http://www.census.gov/hhes/computer/files/2012/Computer_Use_Infographic_FINAL.pdf

U.S. Department of Education. (2009). *Race to the Top Executive Summary.* Retrieved from http://www2.ed.gov/programs/racetothetop/executive-summary.pdf

U.S. Department of Education, Office of Educational Technology. (2010). *Transforming American education: Learning powered by technology.* Retrieved from http://tech.ed.gov/wp-content/uploads/2013/10/netp2010.pdf

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of Information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, *36*(1), 157-178.

Walker, D. F. (2003). *Fundamentals of curriculum: Passion and professionalism* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Webb, J., Schirato, T., & Danaher, G. (2002). *Understanding Bourdieu*. London: Sage Publications.

White, D., & Le Cornu, A. (2011). Visitors and Residents: A new typology for online engagement. *First Monday, 16*(9). doi:10.5210/fm.v16i9.3171

Wolff, B., Knodel, J., & Sittitrai, W. (1993). *Successful focus groups*. D. L. Morgan (Ed.). Newbury Park: Sage.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, *25*, 82-91.

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29*(3), 663-676. doi:10.3102/00028312029003663

Appendix A

Media and Technology Usage and Attitude Scale

(MTUAT) (Rosen et al. 2013)

The following sixty statements are part of the MTUAT's two subscales: usage and attitudes (Rosen et al., 2013). Items have been modified to better fit the research focus of the study.

Usage Subscale

10-point frequency scale

1 – Never 2 – Once a month 3 – Several times a month 4 – Once a week

5 – Several times a week 6 – Once a day 7 – Several times a day

8 – Once an hour 9 – Several times an hour 10 – All the time

Please indicate how often you do each of the following email activities on any device (mobile phone, laptop, desktop, etc.)

1. Send, receive, and read emails (not including span or junk mail).
2. Check your personal email.
3. Check your work or school email.
4. Send or receive files via email.

Please indicate how often you do each of the following activities on your mobile phone.

5. Send and receive text messages.
6. Make and receive phone calls.
7. Check for text messages.
8. Check for voice calls.
9. Read email.

10. Get directions or use GPS.

11. Browse the web.

12. Listen to music.

13. Take pictures.

14. Check the news.

15. Record video

16. Use apps (for any purpose).

17. Search for information.

18. Use your mobile phone during class or work time.

How often do you do each of the following activities?

19. Watch TV shows, movies, etc. on a TV set.

20. Watch video clips on a TV set.

21. Watch TV shows, movies, etc. on a computer.

22. Watch video clips on a computer.

23. Download media files on a computer.

24. Share your own media files on a computer.

25. Search the Internet for news on any device.

26. Search the Internet for information on any device.

27. Search the Internet for videos on any device.

28. Search the Internet for images or photos on any device.

29. Play games on a computer, video game console, or Smartphone BY YOURSELF.

30. Play games on a computer, video game console, or Smartphone WITH OTHER PEOLE IN THE SAME ROOM.

31. Play games on a computer, video game console, or Smartphone WITH OTHER PEOPLE ONLINE.

Do you have a Facebook account? If the answer is "yes," continue with item 32; if "no" skip to the Attitudes subscales below.

32. Check you Facebook page or other social networks.
33. Check you Facebook page from your smartphone.
34. Check you Facebook page at work or school.
35. Post status updates.
36. Post photos.
37. Browse profiles and photos.
38. Read postings.
39. Comment on postings, status updates, photos, etc.
40. Click "Like" to a posting, photo, etc.

Please answer the following questions about your Facebook and other online friends.

9-point scale for the following items

0 1-50 51-100 101-175 176-250 251-375 376-500 501-750 751 or more

41. How many friends do you have on Facebook?
42. How many of your Facebook friends do you know in person?
43. How many people have you met online that you have never met in person?
44. How many people do you regularly interact with online that you have never met in person?

Attitudes Subscale

5-point Likert scale

1 - Strongly Disagree 2 - Disagree 3 - Neither agree or disagree

4 - Agree 5 - Strongly Agree

1. I feel it is important to be able to find any information whenever I want online.
2. I feel it is important to be able to access the Internet any time I want.
3. I think it is important to keep up with the latest trends in technology.
4. I get anxious when I don't have my cell phone.
5. I get anxious when I don't have the Internet available to me.
6. I am dependent on my technology.
7. Technology will provide solutions to many of our problems.
8. With technology anything is possible.
9. I feel that I get more accomplished because of technology.
10. New technology makes people waste too much time.
11. New technology makes life more complicated.
12. New technology makes people more isolated.
13. I prefer to work on several projects in a day, rather than completing one project and then switching to another.
14. When doing a number of assignments, I like to switch back and forth between them rather than do one at a time.
15. I like to finish one task completely before focusing on anything else.
16. When I have a task to complete, I like to break it up by switching to other tasks intermittently.

Appendix B

Motivation and Self-Regulation toward Technology Learning

(MSRTL) (Liou & Kuo, 2014)

Scales 1 and 2

The following ten statements are part of the MSRTL (Liou & Kuo, 2014). Items have been modified to better fit the research focus of the study.

1	2	3	4	5
Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree

1. Whether the technology content is difficult or easy, I am sure that I can understand it.
2. When I am being taught with technology, I can understand the concepts very well.
3. Technology topics are easy for me.
4. I usually do well using technology.
5. I can complete difficult work if I try.
6. I think learning with technology is important because I can use it in my daily life.
7. I think that learning with technology is important because it stimulates my thinking.
8. I think that is it important to learn how to solve problems with technology.
9. I think that is it important to participate in inquiry activities with technology.
10. It is important to have the opportunity to satisfy my own curiosity when learning with technology.

Appendix C

Student Use of Technology – Subscale of the Teacher Technology Survey (SUTS) (Ritzhaupt, Dawson, & Cavanaugh, 2012)

The following 14 items are part of the TTS (Ritzhaupt et al., 2012). Items have been modified to reflect research advancements in technology software and hardware.

Directions: For each type of software please select your response to indicate how often you use the software to complete school-related activities.

1= not at all 2=once a month 3=once a week 4=several times a week 5= every day

Word processors (MS Word, Google docs)	1	2	3	4	5
Spreadsheets (Excel, Google spreadsheet)	1	2	3	4	5
Databases (MS Access, Google spreadsheet)	1	2	3	4	5
Desktop publishing (MS Publisher, Pages)	1	2	3	4	5
Presentation software (PowerPoint)	1	2	3	4	5
Web publishing (Wiki, Wordpress)	1	2	3	4	5
Graphics programs (PhotoShop, Gimp)	1	2	3	4	5
Drill and Practice (apps)	1	2	3	4	5
Games (apps)	1	2	3	4	5
Simulations (SimCity)	1	2	3	4	5
Tutorials (Khan Academy, YouTube)	1	2	3	4	5
Integrated Learning Systems (Moodle, Blackboard)	1	2	3	4	5
Web browsers (Safari, Chrome, FireFox)	1	2	3	4	5
Programming tools (Java Script, Scratch, Visual Basic)	1	2	3	4	5

Appendix D

Classroom Technology Integration Survey – Subscale of the Teacher Technology Survey (CTIS) (Ritzhaupt, Dawson, & Cavanaugh, 2012)

The following 12 items are part of the TTS (Ritzhaupt et al., 2012). Items have been modified to reflect research advancements in technology software and hardware.

Directions: Listed below are teaching modes in which computers may be used. Indicate how often you use computers in each teaching mode.

1=not at all 2=once a month or less 3=once a week 4=several times a week 5=every day

Small group instruction	1	2	3	4	5
Individual instruction	1	2	3	4	5
Cooperative groups	1	2	3	4	5
As a reward	1	2	3	4	5
Independent learning	1	2	3	4	5
To tutor	1	2	3	4	5
To promote student-centered learning	1	2	3	4	5
As a research tool for students	1	2	3	4	5
As a problem-solving/decision-making tool	1	2	3	4	5
As a productivity tool (to create charts, etc.)	1	2	3	4	5
As a classroom presentation tool	1	2	3	4	5
As a communication tool (email, discussions)	1	2	3	4	5

Appendix E

Intrapersonal Technology Integration scale

(ITIS) (Niederhauser & Perkmen, 2008)

The following 21 items are part of the ITIS (Niederhauser & Perkmen, 2008).

Directions: For each statement please select your response.

1	2	3	4	5
Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree

1. I feel confident that I have the necessary skills to use instructional technology for instruction.
2. Using instructional technology in the classroom will make it easier for me to teach.
3. I have an interest in reading articles or books about instructional technology.
4. Using instructional technology in the classroom will increase my effectiveness as a teacher.
5. I am interested in working with instructional technology tools.
6. Using instructional technology in the classroom will make my teaching more exciting.
7. I feel confident that I can effectively use instructional technology in my teaching.
8. Effectively using instructional technology in the classroom will increase my sense of accomplishment.
9. Using instructional technology in the classroom will make my teaching more satisfying.

10. I feel confident that I can regularly incorporate appropriate instructional technology into my lessons to enhance student learning.
11. Effectively using instructional technology in the classroom will increase my colleagues' respect of my teaching ability.
12. My colleagues will see me as competent if I effectively use instructional technology in the classroom.
13. I feel confident that I can select appropriate instructional technology for instruction based on curriculum standards-based pedagogy.
14. I have an interest in working on a project involving instructional technology concepts.
15. Using instructional technology in the classroom will increase my productivity.
16. I feel confident that I can teach relevant subject matter with appropriate use of instructional technology.
17. I am interested in learning about new educational software.
18. I feel confident that I can help students when they have difficulty with instructional technology.
19. I have an interest in listening to a famous instructional technologist speaking about effective use of instructional technology in the classroom.
20. Effectively using instructional technology in the classroom will increase my status among my colleagues.
21. I have an interest in attending instructional technology workshops during my teaching career.

Appendix F

Teacher Use of Technology – Subscale of the Teacher Technology Survey (TUTS) (Ritzhaupt, Dawson, & Cavanaugh, 2012)

The following 14 items are part of the TTS (Ritzhaupt et al., 2012). Items have been modified to reflect research advancements in technology software and hardware.

Directions: For each type of software please select your response to indicate how often you use the software to complete school-related activities.

1= not at all 2=once a month 3=once a week 4=several times a week 5= every day

Word processors (MS Word, Google docs)	1	2	3	4	5
Spreadsheets (Excel, Google spreadsheet)	1	2	3	4	5
Databases (MS Access, Google spreadsheet)	1	2	3	4	5
Desktop publishing (MS Publisher, Pages)	1	2	3	4	5
Presentation software (PowerPoint)	1	2	3	4	5
Web publishing (Wiki, Wordpress)	1	2	3	4	5
Graphics programs (PhotoShop, Gimp)	1	2	3	4	5
Drill and Practice (apps)	1	2	3	4	5
Games (apps)	1	2	3	4	5
Simulations (SimCity)	1	2	3	4	5
Tutorials (Khan Academy, YouTube)	1	2	3	4	5
Integrated Learning Systems (Moodle, Blackboard)	1	2	3	4	5
Web browsers (Safari, Chrome, FireFox)	1	2	3	4	5
Programming tools (Java Script, Scratch, Visual Basic)	1	2	3	4	5

Appendix G

Constructs with Corresponding Survey Items

Construct	Definition	Survey Items
Technology self-efficacy	Personal judgment of the capacity to use technology to accomplish specific goals (Venkatesh et al., 2003; Gu, Zhu, & Guo, 2013)	1. Whether the technology content is difficult or easy, I am sure that I can understand it. 2. I usually do well using technology. 3. I feel confident that I have the necessary skills to use instructional technology for instruction. 4. I feel confident that I can effectively use instructional technology in my teaching. 5. I feel confident that I can regularly incorporate appropriate instructional technology into my lessons to enhance student learning. 6. I feel confident that I can select appropriate instructional technology for instruction based on curriculum standards-based pedagogy. 7. I feel confident that I can teach relevant subject matter with appropriate use of instructional technology. 8. I feel confident that I can help students when they have difficulty with instructional technology.
Attitude toward technology use	Overall positive or negative response to using technology (Davis et al., 1989; Venkatesh et al., 2003)	1. I feel it is important to be able to find any information whenever I want online. 2. I feel it is important to be able to access the Internet any time I want. 3. I think it is important to keep up with the latest trends in technology. 4. I get anxious when I don't have my cell phone. 5. I get anxious when I don't have the Internet available to me. 6. Technology will provide solutions to many of our problems. 7. With technology, anything is possible. 8. New technology makes people waste too much time. 9. New technology makes life more complicated. 10. New technology makes people more isolated. 11. When I am being taught with technology, I can understand the concepts very well. 12. Technology topics are easy for me. 13. I think learning with technology is important because I can use it in my daily life. 14. I think that learning with technology is important because it stimulates my thinking. 15. I think that is it important to learn how to solve problems with technology. 16. I think that is it important to participate in inquiry activities with technology. 17. It is important to have the opportunity to satisfy my own curiosity when learning with technology. 18. I have an interest in reading articles or books about instructional technology. 19. I am interested in working with instructional technology tools.

		20. I have an interest in working on a project involving instructional technology concepts. 21. I am interested in learning about new educational software. 22. I have an interest in listening to a famous instructional technologist speaking about effective use of instructional technology in the classroom. 23. I have an interest in attending instructional technology workshops during my teaching career.
Performance expectancy/ Task-technology fit	The degree to which an individual believes that using technology will help enhance job performance and assist in performing specific tasks (Venkatesh et al., 2003; Gu, Zhu, & Guo, 2013)	1. I feel that I get more accomplished because of technology. 2. Using instructional technology in the classroom will make it easier for me to teach. 3. Using instructional technology in the classroom will increase my effectiveness as a teacher. 4. Using instructional technology in the classroom will make my teaching more exciting. 5. Using instructional technology in the classroom will increase my productivity. 6. Effectively using instructional technology in the classroom will increase my sense of accomplishment. 7. Using instructional technology in the classroom will make my teaching more satisfying.
Personal Factors	The degree to which an individual believes that using technology will help enhance image as a professional (Venkatesh et al., 2003)	1. Effectively using instructional technology in the classroom will increase my colleagues' respect of my teaching ability. 2. My colleagues will see me as competent if I effectively use instructional technology in the classroom. 3. Effectively using instructional technology in the classroom will increase my status among my colleagues.

Appendix H

Focus group protocol

1. Describe your daily interactions with technology. What and how do you use technology outside of school?
    a. How did you learn how to use the technology?
    b. How do you learn about new technologies?
2. Why is engaging with technology easy/difficult/important/not important for you?
    a. What do you like about using technology?
    b. Are you good at it?
3. Describe how you use technology in school.
    a. If you could design/decide how to use technology in school, what would you want to do?
4. What is the value of technology use in school?

Appendix I

Appalachian State University
Informed Consent for Participation in Research Projects

To the Parents of 7th and 10th grade students,

My name is Melanie Mikusa and I am a doctoral student in the Educational Leadership program at Appalachian State University. This semester, I will be conducting research at Avery Middle, Cranberry Middle, and Avery High School. The purpose of my project is to understand how technology self-efficacy and personal engagement with technology affects students' and teachers' attitude toward technology use in education. In order to understand how confident students feel about using technology and their current daily use, I plan to conduct a survey and guided focus groups with students and teachers at AMS, CMS, and AHS.

As a member of the 7th or 10th grade class, your child was selected to participate in a focus group as part of my research project. Your child will only be asked questions related to his or her experience with the technology. The focus group will be led by me at your child's school and will only take approximately 45 minutes to complete.

All responses are anonymous and no names will be connected to the focus group results. All data will be destroyed within two years of completing my dissertation. Students who participate are free to stop participating at any time without penalty.

The focus group will take place during the next several weeks based on availability and weather. Please sign and have your student return this form to school no later than February 18 in order for your child to participate.

Thank you for your consideration,

Melanie Mikusa
mikusame@appstate.edu
(828) 443-0133

_____ Yes, my child may participate in the focus group for this study.

_____ Student Name

_____ Parent or Guardian Name

_____ Signature

Appendix J

Appalachian State University
Informed Consent for Participation in Research Projects

To the Parents of 7th and 10th grade students,

My name is Melanie Mikusa and I am a doctoral student in the Educational Leadership program at Appalachian State University. This semester, I will be conducting research at Avery Middle and Avery High School. The purpose of my project is to understand how technology self-efficacy and personal engagement with technology affects students' and teachers' attitude toward technology use in education. In order to understand how confident students feel about using technology and their current daily use, I plan to conduct a survey and guided focus groups with students and teachers at AMS and AHS.

As a member of the 7th or 10th grade class, your child was selected to participate in an online survey as part of my research project. Your child will only be asked questions related to his or her experience with the technology. The survey will be administered by teachers at school and will only take approximately 15 minutes to complete.

All responses are anonymous and not connected to an IP address. All data will be destroyed within two years of completing my dissertation. Students who participate are free to end the survey at any time without penalty.

The survey will be administered at school on _____. If you do not want your student to complete the survey, please return this form to school no later than _____.

Thank you for your consideration,

Melanie Mikusa
mikusame@appstate.edu
(828) 443-0133

_____ No, my child may not participate in the survey for this study.

_____ Student Name

_____ Parent or Guardian Name

_____ Signature

Appendix K

The Effect of Technology Self-efficacy and Personal Engagement on Students' and Teachers' Attitudes towards Technology Use in Education

Principal Investigator: Melanie Mikusa
Contact Information: mikusame@appstate.edu
Faculty Advisor: Sara Zimmerman, Ph.D.
Contact Information: zimmermnsj@appstate.edu

Consent to Participate in Research
Information to Consider About this Research

I agree to participate as a member of a focus group for this research project, which concerns the effects of technology self-efficacy and personal engagement on students' and teachers' attitudes towards technology use in education. The interview will take place at school during regular school hours. There will be only one focus group meeting lasting approximately 20 minutes. I understand the focus group will be about how technology self-efficacy and personal engagement with technology affects students' and teachers' attitude toward technology use in education.

I understand there are no foreseeable risks associated with my participation. I also know that this study may help the researcher better understand the effects of technology self-efficacy and personal engagement on students' and teachers' attitudes toward technology use in education. Additionally, this information may help ACS in providing professional development opportunities within the technology plan they have in place.

I give Melanie Mikusa ownership of the transcripts and recordings from the focus group she conducts with me and understand that the transcripts and recordings will be kept in her office until the completion of her dissertation research at which time all transcripts both written and audio will be destroyed. I understand that information or quotations from the focus group will be used in her dissertation. I understand I will not receive compensation for my participation.

I understand that participation is voluntary and there are no consequences if I choose not to participate. I also understand that I do not have to answer any questions and can end my participation at any time with no consequences.

If I have questions about this research project, I can call Melanie Mikusa at *(828) 443-0133* or the Appalachian Institutional Review Board Administrator at 828-262-2692(days), through email at irb@appstate.edu or at Appalachian State University, Office of Research Protections, IRB Administrator, Boone, NC 28608.

This research project has been approved on 10/27/14 by the Institutional Review Board (IRB) at Appalachian State University. This approval will expire on 10/27/15 unless the IRB renews the approval of this research.

By signing this form, I acknowledge that I have read this form, had the opportunity to ask questions about the research and received satisfactory answers, and want to participate. I understand I can keep a copy for my records.

Participant's Name (PRINT) Signature Date

Appendix L

The Effect of Technology Self-efficacy and Personal Engagement on Students' and Teachers' Attitudes towards Technology Use in Education

Principal Investigator: Melanie Mikusa
Contact Information: mikusame@appstate.edu
Faculty Advisor: Sara Zimmerman, Ph.D.
Contact Information: zimmermnsj@appstate.edu

Consent to Participate in Research

Information to Consider About this Research

To the teachers of Avery Middle, Cranberry Middle, and Avery High School,

My name is Melanie Mikusa, and I am a doctoral student in the Educational Leadership program at Appalachian State University. This academic year, I will be conducting research at Avery Middle and High schools. The purpose of my project is to better understand the effects of technology self-efficacy and personal engagement on students' and teachers' attitudes toward technology use in education. To better understand this concept I plan to conduct a focus group with teachers at Avery Middle, Cranberry Middle, and Avery High.

You have been randomly selected to potentially be included in the focus group as part of my research. I will include the first ten middle school teachers and the first ten high school teachers whose consent forms are returned. Forms should be returned to the main office. Participants will be entered into a drawing for a $50 gift card. You will only be asked to discuss technology use by students and teachers related to educational opportunities.

In order to participate in this study, please read through the following information and sign if you agree:

I agree to participate as a member of a focus group for this research project, which concerns the effects of technology self-efficacy and personal engagement on students' and teachers' attitudes towards technology use in education. The focus group meeting will take place at school during regular school hours. There will be only one focus group meeting lasting approximately 60 minutes. I understand the focus group will be about how technology self-efficacy and personal engagement with technology affects students' and teachers' attitude toward technology use in education.

I understand there are no foreseeable risks associated with my participation. I also know that this study may help the researcher to better understand the effects of technology self-efficacy and personal engagement on students' and teachers' attitudes toward technology use in education. Additionally, this information may help Avery County Schools in providing professional development opportunities within the technology plan they have in place.

I give Melanie Mikusa ownership of the transcripts and recordings from the focus group she conducts with participants and understand that the confidential transcripts and recordings will be kept in her office until the completion of her dissertation research at which time all transcripts written and audio will be destroyed within two years. I understand that information or quotations from the focus group will be used in her dissertation. I understand I will not receive compensation for my participation. All participation in the focus group will be kept confidential

and any outcomes from this study shared with the school district will center on professional development opportunities and be presented in the aggregate.

I understand that participation is voluntary and there are no consequences if I choose not to participate. I also understand that I do not have to answer any questions and can end my participation at any time with no consequences.

If I have questions about this research project, I can contact Melanie Mikusa through email at mikusame@appstate.edu or call her at *(828) 443-0133* or the Appalachian Institutional Review Board Administrator at 828-262-2692 (day-time phone number), through email at irb@appstate.edu or at Appalachian State University, Office of Research Protections, IRB Administrator, Boone, NC 28608.

This research project has been approved on 12/10/14 by the Institutional Review Board (IRB) at Appalachian State University. This approval will expire on 12/10/15 unless the IRB renews the approval of this research.

By signing this form, I acknowledge that I have read this form, had the opportunity to ask questions about the research and received satisfactory answers, and want to participate. I understand I can keep a copy for my records.

Participant's Name (PRINT) _____ Signature _____ Date

Vita

A native of Ohio, Melanie Ellen Mikusa earned her Bachelor of Arts degree in 1982 from The Ohio State University. She taught in a residential treatment center for six years before moving to North Carolina to pursue employment with the North Carolina Outward Bound School. After 10 years in outdoor education, Ms. Mikusa accepted a teaching position at Morganton Day School, an independent JK-8 International Baccalaureate school. During her 16 years of teaching kindergarten and first grade, Ms. Mikusa earned her Master of Arts degree from Appalachian State University and completed her National Board Professional Teaching certification. In order to gain administrative experience, Ms. Mikusa worked for the Family, Infant, and Preschool Program for two years before returning to Morganton Day School. She is currently Head of School and is responsible for overall operations as well as infusion of technology into the curriculum. In 2015 she received a Doctorate of Education in Educational Leadership from Appalachian State University.

Ms. Mikusa resides with her husband in North Carolina where she enjoys running, rock climbing, and outdoor adventures.