A COMPARISON OF STUDENT PERCEPTIONS OF ACADEMIC, SOCIAL, AND EMOTIONAL SELF-EFFICACY IN CLASSROOMS WITH DIVERGENT APPROACHES TO INTEGRATING INSTRUCTIONAL TECHNOLOGY

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ABSTRACT

As society advances in technology, it is important that our educational systems have a unified understanding of how technology should be used inside the classroom (Bitter & Pierson, 2001; Oppenheimer, 2003). However, literature is mixed on whether technology impacts the learner positively or negatively (Brusca, 1991; Cassil, 2005; Cuban & Cuban, 2009; Kulik, 2003; Li & Ma, 2010; Strong, Torgerson, Torgerson, & Hulme, 2011; Torgerson et al., 2004; Waxman, Connell, & Gray, 2002). A number of researchers state that technology in schools can have a positive impact on achievement (Brusca, 1991; Cuban & Cuban, 2009; Li & Ma, 2010) while other researchers concluded that the distractions provided by technology decrease achievement and the habits it instills are harming students' development, both academically and socially (Cassil, 2005; Kulik, 2003; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002).

Various findings on the impact of technology as it relates to learning achievement suggest that there is a variable beyond the technology itself that may affect student learning (Cassil, 2005; Kulik, 2003; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002). Despite a large amount of literature on the impact of technology on educational achievement, there is a lack of literature related to the impact of technological approaches on learner self-efficacy, a strong predictor of achievement (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001).

This study aimed to fill the gap by determining if a relationship exists between students' academic, social, and emotional self-efficacy and their classroom's approach to integrating technology. Classrooms involved in the study were separated based on their approach to

integrating technology and assessments were administered to each student. The first assessment was a specialized measure of self-efficacy, developed by Peter Muris (2001). The second was a measurement of technological competence, developed by the researcher. The results of the study showed significant relationships between self-efficacy and several factors involved in integrating technology.

DEDICATION

This study and the countless hours that went into it are dedicated to my love, Julie, and the three little ones we welcomed during this journey: Eric, Rory and Ellie. The inspiration, patience, and grace you gave to me brought us here and, from here, we can go anywhere...

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The diffusion of technology into education has long been a topic of debate (Clark, 1983; Kozma, 1994). A lack of conclusive research and a consistent emergence of new technologies has some researchers asserting that technology has a positive impact on learning in the classroom, while others assert that it does more harm than good (Clark, 1983; Kozma, 1994). Early research in instructional technology rarely supported its use, reiterating the sentiment of Clark (1983) who stated, “the best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes to our nutrition” (p. 446). In other words, the use of educational technology does not affect how people learn. Many researchers have made significant assertions about technology’s lack of educational value (R. E. Clark, 1983; Kozma, 1994). However, the use of technology in the classroom has continued to grow exponentially over the last 30 years (Bitter & Pierson, 2001; Branch, 2015; Calisir, Altin Gumussoy, Bayraktaroglu, & Karaali, 2014; Collins & Halverson, 2009; Kirkwood & Price, 2014; Mao, 2014).

Technology’s growth can often be attributed to the constant development of new emerging technologies (Bitter & Pierson, 2001; Branch, 2015; Calisir et al., 2014; Collins & Halverson, 2009; Kirkwood & Price, 2014; Mao, 2014). This new technology landscape has also led to an increase in research and innovation on the use of technology for learning. The increase in innovation has provided sufficient foundation for some institutions to adopt online learning as a new classroom (Henrich, Molenda, Russell, & Smaldino, 1999).

The Internet's capacity for individualizing virtual experiences, such as recommending content based on someone's interest, has led to the creation of social media applications and collaboration tools that are designed to be customized for each participant (Massy & Zemsky, 1996). Online experiences have become so personalized that technology no longer needs to be promoted in order to be used in educational environments; it has been passively inducted as a self-selected tool (Bitter & Pierson, 2001; Oppenheimer, 2003). In addition, students bringing their own technology into schools has become increasingly commonplace due to the expanding availability and affordability of technology today (Gray, Thomas, & Lewis, 2010). A 2001 study by the Pew research center concluded that students are increasingly engaging in learning online regardless of competence, grade-level, or socioeconomic status (Center, 2001).

As our society advances in technology, it is important that our educational systems have a consistent understanding of how to use technology effectively inside the classroom (Moran et al., 2008). However, the literature reveals that researchers and practitioners are divided on whether technology impacts the learner positively or negatively (Brusca, 1991; Cassil, 2005; Cuban & Cuban, 2009; Kulik, 2003; Li & Ma, 2010; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002). Some researchers believe that, without consistently integrating the most current technology in our schools, future generations of learners will be less successful academically, socially, and vocationally (Brusca, 1991; Cuban & Cuban, 2009; Li & Ma, 2010). Some researchers, however, describe how technology can decrease achievement because of distraction and a lack of accountability, leading some to explore whether technology can help students at all (Cassil, 2005; Kulik, 2003; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002). To help answer that question, researchers have focused their efforts on studying secondary variables, specifically those associated with achievement such as retention, class-size, and gender differences (Boekaerts & Cascallar, 2006; Brookhart, 2004; Fernandes & Fontana, 1996). In the last 20 years, there has been an increase in studies trying to determine if these secondary variables may be positively or negatively affected by the integration of technology (Boekaerts & Cascallar, 2006; Brookhart, 2004; Fernandes & Fontana, 1996).

Additionally, a small number of researchers have explored links between using technology in learning and other variables (Royer, 2002). Although little has been concluded, some have suggested that technology's impact on students may depend on environmental factors (Royer, 2002). Two important environmental factors that have the capacity to influence technology include an attitude toward the integration of technology in learning and the approach by which educational technology is viewed (Royer, 2002). Fisher (2010) proposes that the essential environment for technology to impact factors, such as self-efficacy, is one that takes into consideration socially dependent factors, specifically attention, persistence, flexibility, motivation, and confidence. Further, Fisher (2010) states that these factors can be improved by making the environment more conducive to these behaviors a task for which some technology is specifically suited. Fisher's (2010) assertion that there may be a relationship between technology and environment was built on a decade of study and debate (Bandura & Cervone, 1986; Corno, 1986; Zimmerman, 2000).

Previous research has not only suggested that self-efficacy can be affected by the learning environment (Bandura & Cervone, 1986; Corno, 1986; Zimmerman, 2000), but also that technology is one of the most significant factors in the learning environment (Abachi & Muhammad, 2014; Ally, 2004; Alsufi, 2014; Bitter & Pierson, 2001; Marchionini, 1988;

Wheeler, Renchler, Conley, & Summerlight, 2000). C. M. Christensen, Horn, and Johnson (2008) stated that, although schools exist to develop the skills, capabilities, and attitudes of students, our educational system is not equipped to achieve its objectives without new technologies. C. M. Christensen et al. (2008) concluded that intrinsically engaging methods of learning are the answer, and educational technology could be effective at developing those methods. Although many researchers, educators, and administrators agree that technology has the capacity to influence the learning process (C. M. Christensen et al., 2008, p. 23), few seem to agree on how that should be accomplished. This lack of consensus has led schools to decide when and how they will utilize technology in learning (Oppenheimer, 2003).

While there has been a great deal of research on the efficacy of technology tools for teaching and learning, many of these studies do not translate well to the reality of the classroom (Wallace, Blasé, Fixsen, & Naoom, 2008). A translation problem exists due to the difficulty of generalizing across technology integrations because of the wide variety of technologies being implemented (Wallace et al., 2008). Wallace et al. (2008) also cite the different ways technology is implemented and the varying degrees of technological competence among teachers as significant factors. In short, schools integrate technology in different ways and with different motivation, which lead to different outcomes. Further, as these differing methodologies become more common the lack of literature exploring the success of those methodologies becomes more apparent.

The literature is divided into three main approaches schools use for integrating technology in learning: the technology adverse approach, the technology enhanced approach, and the technology integrated approach. Each is different from the others in both execution and how the approach influences learners. Due to the differences between each approach, this study broadly refers to them as divergent approaches. The first, defined by Barnes (1991) as the technology adverse approach, involves schools choosing to omit technology-related assignments from the curriculum or not to allow technology use in the building at all (Barnes, 1991). The second, defined by Cuban et al. (2001) as the technology enhanced approach, involves schools only utilizing technology as a tool for completing specific assignments (Staples, Pugach, & Himes, 2005; Windschitl & Sahl, 2002). For example, an English class that includes time in a computer lab to do a typing assignment is embracing the technology-enhanced approach. The last, defined by Cuban et al. (2001) as the technology integrated approach, involves schools utilizing technology as a platform for experiential, self-regulated learning (Hernández-Ramos, 2005; Windschitl & Sahl, 2002). For instance, a class where students are assigned tablets to use for textbooks and online learning opportunities is embracing the technology-integrated approach. Schools have used this approach to create an open-ended environment for the purpose of informal, and often self-regulated, learning (Alsufi, 2014; Elmer-DeWitt, 2011; Pegrum, Oakley, & Faulkner, 2013).

Although there is a current trend in studying the impact of technology on education, the majority of recent studies do not consider the implications of how technology is implemented in the first place (Oppenheimer, 2003). Further, there is a lack of literature on the impact of technological approaches on learner self-efficacy. The concept of self-efficacy is explained by Bandura (1997) as a learner's beliefs about how successful s/he can be in performing a task. Research shows that those who do not believe they can successfully complete a task will perform worse on average when compared to those who are unsure or feel they can (Jackson, 2002; Lane & Lane, 2001; Pajares, 1996, 2003). The aim of this study is to attempt to address the gap in research mentioned above by exploring the relationship between self-efficacy and technology.

Statement of the Problem

In the last decade, the integration of instructional technologies in the classroom has become of paramount importance for educators and administrators alike (McDowell, 2013). In an effort to keep pace with the widespread perception of technology's importance to learning, some schools have rushed to integrate technology anywhere and in any way possible (Staples et al., 2005). A study of the stages of implementation by Wallace et al. (2008) concluded that some schools find themselves constantly repeating a series of initial implementation efforts, unsuccessfully integrating one technology after another. Other schools are rebuking the trend of integrating technology within the curriculum, citing conflicting research that technology's use can be detrimental to the learning process (Barnes, 1991). Royer (2002) further explains that, while some type of technology is present in nearly every classroom in the country, it is rarely applied consistently or effectively.

With such a divide in the literature involving the effectiveness of technological approaches, educators and administrators are often left wondering how to proceed (Calisir et al., 2014; King, 2002; Oppenheimer, 2003; Perrotta, 2013; Young, 2004). According to researchers Chen (2008) and King (2002), educators face difficult decisions when incorporating an expanding array of technological resources in education. When considering technology's impact on learner accomplishment, educators should be guided by Bandura's theory of self-efficacy (as cited in King, 2002). Bandura (1997) theorized that both self-efficacy and technology have the capacity to augment personal accomplishments. However, aside from the work of Bandura (1997), few researchers have studied the nexus between technology and self-efficacy. Muris (2002) stated one reason for the dearth in research may be that, in order to fully investigate learner self-efficacy, one must examine the learner's academic, social, and emotional self-efficacy respectively. This study examined each of the three types of self-efficacy (i.e., academic, social, and emotional) defined by Muris (2002) in the context of divergent approaches to the integration of technology in schools.

Purpose of the Study

The purpose of this study was to examine the effect divergent approaches to integrating technology into learning may have on academic, social, and emotional self-efficacy. Although there are many studies measuring the effectiveness of technology currently in the classroom, there is a lack of literature addressing what technologies are the most effective and how they should be used in schools to achieve the best results. This gap highlights the need to study the impact of technology integration on learners and is leaving many schools questioning the best way to integrate technology into learning (Calisir et al., 2014; King, 2002; Oppenheimer, 2003; Perrotta, 2013; Young, 2004). By examining the relationship between a learner's self-efficacy and their classroom's approach to integrating technology, this study may provide further insight on how schools should approach this issue (Reid & Ostashewski, 2011).

This study addressed the problem by discussing the various approaches schools and teachers take when integrating technology and, for each approach, surveying learners to assess their academic, social, and emotional self-efficacy. The researcher analyzed the data gathered to determine whether a relationship exists between a classroom's approach to technology integration and their students' perceived academic, social, and emotional self-efficacy.

Research Questions

The focus of this study was to compare the academic, social, and emotional self-efficacy of students in schools with divergent approaches to integrating technology. The underlying research questions (RQ) include,

1. Is there a significant difference in self-efficacy between students in classrooms with divergent approaches to technology?
    a. Is there a significant difference in mean academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?
    b. Is there a significant difference in mean social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?
    c. Is there a significant difference in mean emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?
2. Is there a significant relationship between students' self-efficacy scores and their level of self-reported technological competence?
    a. Is there a significant relationship between students' mean academic self-efficacy scores and their level of self-reported technological competence?
    b. Is there a significant relationship between students' mean social self-efficacy scores and their level of self-reported technological competence?
    c. Is there a significant relationship between students' mean emotional self-efficacy scores and their level of self-reported technological competence?

3. Is there a significant difference in self-reported time spent using technology between students in classrooms with divergent approaches to technology?
    a. Is there a significant difference in self-reported time spent using technology inside school between learners in technology enhanced, technology integrated, and technology averse classrooms?
    b. Is there a significant difference in self-reported time spent using technology outside of school between learners in technology enhanced, technology integrated, and technology averse classrooms?
4. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology?
    a. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school?
    b. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside school?

Rationale for the Study

Using 21st century technology in the classroom might be classified by some as a trend, but it shows no signs of slowing down (Brown, 2011; Fisher, 2010; Marchionini, 1988). Many believe that those who do not adopt technology in their teaching will become more ineffective at reaching future generations (Wheeler et al., 2000). Waxman et al. (2002) emphasized the need for technology in learning in order to problem solve in an evolving and knowledge-based digital society. Further, technology has shown positive impacts on educational processes, learning outcomes, and student performance (Lumpe & Chambers, 2001). Beyond a perceived need for technology, some embrace it because they are early adopters (Hall & Elliott, 2003; Rogers, 2010). Rogers (2010) defines early adopters as those who are first to try a new idea simply because it is new and, in their mind, worth exploring. Others accept technology because of societal pressures (Jaber, 1997) while some educators begin utilizing technology in their classroom solely because their administrators praise others who do (Jaber, 1997).

Technology use outside of learning purposes is also growing exponentially (Center, 2001). With technology having such a widespread impact, researchers are beginning to realize that the adoption and use of technology for learning affects more than learning methodology alone. Even as early as 1994, researchers were convinced that technology in the classroom could have varying effects on student learning (Kulik, 2003). Kulik (2003) published a meta-analysis of over 500 individual studies on educational technology and found that technologies positively affected time management skills, learning efficacy, student achievement, and classroom behaviors. Since then, researchers have only confirmed those findings (Branch, 2015; Butler, Marsh, Slavinsky, & Baraniuk, 2014; Collins & Halverson, 2009; Fijor, 2010; Fisher, 2010; Kirkwood & Price, 2014; McDowell, 2013). However, there is a shortage of studies investigating technology’s relationship with other, more psychosocial factors. This study examined if a relationship exists between technology and learner self-efficacy, which is one of those psychosocial factors. This study may be an important resource to educators, administrators, and parents inquisitive about how a classroom’s approach to instructional technology may affect the motivations and behaviors of the learners.

Significance/Importance of the Study

A review of the literature reveals that research in the use of technology has become very important to both learners and educators (Richey, Klein, & Tracey, 2011; Tutty & Klein, 2008). Many of those studies have concluded that the use of educational technology in our society is essential because it increases distribution of learning across an evolving digital culture (Richey et al., 2011; Tutty & Klein, 2008) and opens up new avenues of learning methodology (Ip, Morrison, & Currie, 2001). In addition, researchers over the last 30 years have stated that the innovation of technology in our society will require teachers to fully embrace it in order to truly prepare our children for the future (Marchionini, 1988; Perrotta, 2013; Wheeler et al., 2000). This has been increasingly evident as the evolution of technology in our daily life and social systems has led to the modernization of information (Abachi & Muhammad, 2014; Akilli, 2007; Alsufi, 2014).

Some researchers believe that a shift in communicating using technology rather than in person has been the driving force of social evolution (Mao, 2014; Windschitl & Sahl, 2002). Some educational researchers have stated that, for schools to be considered relevant, the inclusion of educational technologies must be automatic and commonplace (Collins & Halverson, 2009; Gray et al., 2010). At our current rate of technological innovation, instructional technology will continue to expand and the debate over the success of technology in learning will only grow more important for parents and educators (Alsufi, 2014; Center, 2001; Elmer-DeWitt, 2011; Pegrum et al., 2013). To get a better understanding of technology's impact on learning, this study investigated if a relationship exists between certain approaches to integrating technology and learner self-efficacy. Examining this relationship may give insight into the effectiveness of one approach over another in maximizing learner self-efficacy. Further, the data collected in this quantitative study may provide insight into the relationship between technology and self-efficacy, as well as provide suggestions for further research.

Conceptual Framework

The first foundational concept in this study is that learning institutions, and the classrooms inside them, have divergent approaches to the use of technology for learning. Some classrooms approach technology as a tool, using it for completing a task, while some classrooms approach technology as an environment, utilizing social spaces to motivate informal learning between students (Gikas & Grant, 2013). The fact that technology has grown exponentially in its use as an instructional tool is not up for debate, but rather common knowledge in our society (Center, 2001). However, the effectiveness of technology in educational programs, and learning in general, has been a topic of contention in recent research. Brown (2011) states that the effectiveness of technology in learning is subject to "the way in which the technology is integrated into the curriculum and how it is viewed by students, teachers, and school administrators" (p. 22). Klein (2010) also concluded that the way technology is integrated into the classroom makes a difference:

> Technology is only a tool; it allows us to develop dialogue and interaction, but is a means, not an end in and of itself. Tech-based global education has the capacity to improve critical thinking and cultural pluralism but requires far more than just fancy technology; it requires careful, thoughtful curriculum development, and the support of organizations whose goal is to build authentic global communities online. (p. 86)

Klein (2010) recognized that the same technology can be used in a variety of different ways and lead to a variety of different results, all based on how it is presented and used.

In addition, the way technology is viewed by students, teachers, and school administrators has been shown to be a factor in how technology is adopted and whether or not it has an effect on student achievement (Abbott & Shaikh, 2005; Mallan, Foth, Greenaway, & Young, 2010; Perrotta, 2013; Sinclair, 2009; Tay & Lim, 2010). Perrotta (2013) surveyed 683 teachers involved in integrating technology at different levels and found that the most significant factor to the success of technology integration was the complex relationship between teachers' perceptions of the technology and its ease of use. Albion (1999) noted that the link between technology integration and improving academic achievement is high self-efficacy, of which teachers' perceptions and ease of use are contributing factors. As seen in the literature, researchers have only recently recognized the importance of defining how technology should be integrated, due to its potential of positively affecting student achievement.

The conceptual framework of this study is based on analyzing divergent approaches to technology integration. These approaches can be differentiated using the two previously stated themes: (a) the way technology is integrated into learning and (b) the way technology is viewed by the students, teachers, and school administrators. As seen in Figure 1, these themes are responsible for shaping an institution's approach to technology integration, and an institution's approach can affect learner self-efficacy, as they are both a part of the learner environment.

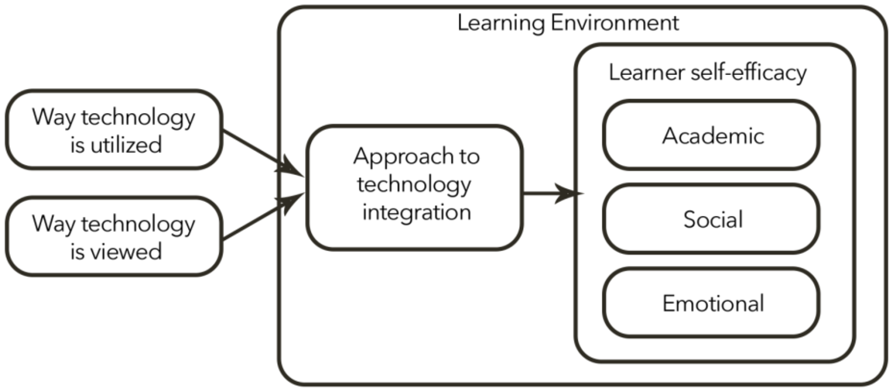

Figure 1.1 Approach to technology integration directly affects self-efficacy

The second foundational concept in this study is that the use of technology in learning has the potential to support a learner's self-efficacy. Research on the influence of self-efficacy concludes that it significantly impacts task choice, effort, performance, and perseverance (Bandura, 1997; Reynolds, 1988). Further, a learner's self-efficacy can actually be a high predictor of academic achievement (Bandura et al., 2001). In a recent study, Muretta Jr. (2005) claimed to be the first to empirically explore the link between behaviors and the development of self-efficacy. In the study, he concluded that the perception of subject mastery and physiological arousal were the two most significant building blocks to its development (Muretta Jr., 2005). Since Muretta Jr. (2005), many researchers now agree that technology has a unique opportunity to increase achievement through the development of confidence and the perception of subject mastery (Chandra, 2009; Muretta Jr., 2005).

The approach of this study is to assess, from each divergent approach, a representative sample of learners for their academic, social, and emotional self-efficacy. The aim of the research is to compare the self-efficacy of learners across divergent approaches to integrating technology in order to examine if a relationship exists between how a teacher approaches the use of technology and the self-efficacy of the students they teach. Further, the data collected in the study provides insight into how technology should be integrated as well as provide suggestions for further research.

Definition of Terms

The following operational definitions were used in the study:

Academic Self-Efficacy – A belief in one's ability to succeed academically in specific learning situations (Bandura, 1997).

Collaborative Learning – An educational approach that involves groups of students working together to problem solve (Dillenbourg, 1999).

Early Adopters – An individual or group of individuals who begin using a technology as soon as it becomes available (Ram & Jung, 1994).

Educational Technology – The study and practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Technology, 2008).

Emotional Self-Efficacy – A belief in one's ability to maintain emotional control in a specific situation (Bandura, 1997).

Instructional Technology – The study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Technology, 2004).

Self-Efficacy – The amount of confidence and control one has in the ability to accomplish a specific task (Bandura, 1997).

Social Self-Efficacy – A belief in one's ability to maintain an effective social presence amongst one's peers (Muris, 2001).

Technology Averse – Avoiding the use of technology in learning until it can be applied after subject mastery and without distraction (Barnes, 1991).

Technology Enhanced – Approaching technology as a tool for a specific use, controlling the use of technology to specific assignments in the curricula (Cuban et al., 2001).

Technology Integrated – Approaching technology as a platform for collaborative and experiential learning (Cuban et al., 2001).

Methodological Assumptions

The researcher's methodological assumptions will include that the sample is large enough to be representative of the behaviors exhibited by most students in middle grades (six through eight), and they were honest in completing the instrument. Although the researcher intended to control for bias, it should be noted that bias could exist because some participants may be more motivated to fully complete the survey or feel more comfortable using the survey method used by the researcher. In addition, it is assumed that pilot testing the instrument with a similar sample will establish validity and reliability for the instrument in this study. Also, the survey and resulting data gathered was dependent upon participants' accurate representation of their behaviors. Lastly, it is assumed that the technology in the classroom will accurately represent the technology being used for a learning purpose.

Delimitations of the Study

The researcher delimited this study to schools that align with the approaches of integrating technology as outlined by the researcher. The students sampled will share similar curricula, age, gender, and geographic characteristics. Also, for the purpose of this study, educational technologies were limited to those that are used in the classroom environment.

Limitations of the Study

The researcher was limited in the implementation and scope of this study by several factors. First, the study's implementation was limited by a fixed research budget, a small sample size, and the short time frame in which this research was produced and studied. The implementation is also limited by the nature of the sample selection as each group is categorized by the way technology is currently integrated, without a thought to what occurred in the past. Second, the sample itself has a vast number of variables including recruiting and geographic location. In addition, each individual may utilize other technologies outside of the classroom. Although this study does attempt to measure perceived technological competence overall, there is no way to definitively determine technological competence outside of the classroom. Thirdly, the scope of this study is limited to technology integrated by the school and will not address any technologies outside of those used for the purposes of learning.

Further, the use of a self-assessment carries certain issues such as the instrument's credibility, delivery method, and the countenance of the learner when assessed. Also, being a part of the classroom curricula does not ensure a learner will use the technology provided (Kichuk & Wiesner, 1998). The researcher is also limited in population and sample as two schools were targeted for this study. This population was limited due to geographic location, socioeconomic status, and language. Lastly, it should be mentioned that any past performance with technology could not imply a guarantee of future success (Buckingham & Coffman, 1999).

CHAPTER II

LITERATURE REVIEW

The review of the literature provides a link between integrating technology in learning, academic self-efficacy, social self-efficacy, and emotional self-efficacy. In order to create a context for the importance of self-efficacy, a general foundation of learning theories and the commonalties between learning theories and self-efficacy must first be explored. This chapter will conclude with an exploration of how technology and self-efficacy affect one another.

Learning Theories

Learning occurs among individuals and groups, with physical and virtual interactions, and for both intrinsic and extrinsic reasons (M. C. Smith & Pourchot, 2013). However, foundational to learning is how an individual processes information in order to retain and retrieve it in the future (Pinker, 1994). Regardless of context, learning cannot occur without a cognitive process designed to retain a memory of something an individual has not previously known or experienced (Pinker, 1994). It is valuable to note that individual learning does not necessarily lead to group learning or change in a learning community (Ikehara, 1999) as those events include factors outside the traditional learning theory, like group dynamics. However, some researchers believe it should be the goal of learning communities to shape themselves with the collective knowledge and experiences of learned individuals (Pellegrino, 2004). Many theories have emerged to explain how individual and group learning has changed long evolutionary history

(Feichtner & Davis, 1984; Schunk & Zimmerman, 2007; Slavin, 1990). Some of these various perspectives in learning include the following theories: behavioral theory, cognitive theory, and social cognitive theory (Feichtner & Davis, 1984; Schunk & Zimmerman, 2007; Slavin, 1990).

Behavioral Theories

Theories of behaviorism focus on how individuals learn and manage their own actions (Schunk, 1996). At the most basic level, human behavior can be explained by examining our reaction to basic needs (Bandura, 1977; Schunk, 1996) and how they are reinforced (Pavlov, 2003; Pavlov & Anrep, 1960). The theory of classical conditioning, introduced by Pavlov in 1927, explores the relationship between stimulus and response. Pavlov (2003) suggested that learning happens when a formerly neutral stimulus, paired with an unconditioned stimulus, becomes a conditioned stimulus that elicits a conditioned response (Pavlov, 2003; Pavlov & Anrep, 1960). Contemporary terminology defines this as reflexive behavior, characterized by a directly correlative relationship, where the strength and frequency of our actions is subject to the strength and frequency of the needs being met as a result (Skinner, 1938, 1953).

The concept of wanting to repeat an action because it meets a need, known as behavioral reinforcement, was further expanded by Skinner (1953) in the theory of operant conditioning. This theory emphasizes the strength of the environment in reinforcing actions (Skinner, 1938, 1953). Operant conditioning changes the original stimulus supposition by stating that the environment itself is responsible for reinforcing behavior through the natural law of consequence (Skinner, 1938, 1953) and, therefore, plays an important role in shaping and maintaining behavior. Further, if operant conditioning is correct, than either changes in consequences or the environment can affect how people choose to act (Skinner, 1938, 1953).

Researchers in the years after Skinner, however, have agreed that the relationship between one's environment and the consequences to one's actions may be enough to reinforce behavior, but not completely change it (H. J. Eysenck, 1976a; H. J. Eysenck & Eysenck, 1987; Wolpe, 1968). Instead of relying on environmental factors to change behavior as Skinner had suggested (1953), new research concludes that intentially replacing old behaviors with newer ones, called reciprocal inhibition (Wolpe, 1968), is more effective. The reciprocal inhibition theory (Wolpe, 1968) states that in order to make room for newer behaviors, old ones must be unlearned or replaced by continual exposure to different responses. In simpler terms, one must elicit a competing response to a behavior in order to decrease the impact of a previously learned one.

The role of the environment in reciprocal inhibition theory is to bring about new responses to an unchanged stimulus (Wolpe, 1968). An example can be seen in how some social networking communities encourage aggressive and outlandish behavior toward others through praise and attention. The same comments that would have been shunned by the community if made in person are emboldened by the community online, therefore, encouraging more of that behavior. Palich and Bagby (1995) concluded that these changes bring about a decrease in the strength of a stimulus. This is challenged by the incubation theory of H. J. Eysenck (1976b), which states that behavior followed by negative consequences is not always eliminated and may be reinforced instead (H. J. Eysenck, 1976b; H. J. Eysenck & Eysenck, 1987; M. W. Eysenck, 2000). Broadly, behavioral theory suggests that,

> Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of native response tendencies, maturation, and temporary states of the organism. (Hilgard & Bower, 1966, p. 2)

Therefore, learning can be defined by the development, maintenance, and retention of behaviors (Nelson, Johnson, & Marchand-Martella, 1996).

Cognitive Theories

Cognitive theories explore learning through relationships between environmental cues, human thought, and the expectancy of outcomes (Luthans, 1998a, 1998b). These outcomes are being constantly evaluated by the mind and, as a result, the mind creates expectations based on our decisions (Kahneman, Diener, & Schwarz, 1998). This can be seen through the dichotomy of labor and monetary compensation (Luthans, 1998a, 1998b). For example, it would be hard to find a person to work an eight hour shift in a factory without the cognitive expectation of monetary reward for their effort (Luthans, 1998a, 1998b). The cognitive perspective of learning theory emphasizes the need for a levels-based approach (Bransford, Brown, & Cocking, 2000). For instance, novices and experts think differently and, therefore, should be developed separately to maximize their individual potential (Bransford et al., 2000). Pinker (1994) emphasized the neurological science of learning by concluding that physiological and psycholinguistic patterns occur as an individual engages in learning.

Parallel with cognitive theory are scientific discoveries in cognitive science that focus more on the structures and processes of human competence, such as the role of memory and information processing, rather than on the acquisition of behavior (Luthans, 1998b). These theories have been used to inform how aspects of one’s environment effects their learning (Luthans, 1998b). In other words, an environment that triggers strong emotions will positively affect learning, regardless of what theory is applied, due to the nature of how we process emotional stimuli (LeDoux, 1994). For example, Nielson and Powless (2007) studied in the use of media to create learning environments that emphasized either positive or negative emotional stimulus. In their study, students were presented with a word list to learn before being shown either a video clip of comedy or a surgery taking place (Nielson & Powless, 2007). The emotional response to the video created stronger memories, as evidenced by significantly enhanced retrieval of the learned information (Nielson & Powless, 2007; Pinker, 1994). In 1941, research in cognitive theory expanded to include one's ability to learn by observing the behavior of others (Miller & Dollard, 1941). This concept, the impact of one's social environment on learning, became the foundation of a new theory. From its conception, social cognitive theory intended to highlight the major role cognition played in encoding and performing behaviors (Miller & Dollard, 1941).

Social Cognitive Theory

In 1941, Miller and Dollard developed the social cognitive theory to discount traditional behavioral and cognitive theories and, instead, defined learning as a natural reaction to the human drive (Miller & Dollard, 1941). However, it was not until Bandura and Walters (1963) wrote *Social Learning and Personality Development* that an emphasis in social discovery was developed into the social cognitive theory. Bandura and Walters (1963) widened the frontiers of social learning by proposing principles of observational learning and vicarious reinforcement (Bandura & Walters, 1963). The social cognitive theory would be the predecessor of what we know today about self-efficacy.

The common social cognitive model is that stimuli are processed through a social and emotional filter before leading to a response (Bandura, 1986). For example, people are more likely to learn and repeat a behavior if they observe it being learned and repeated by their peers

(Lent & Brown, 2013). Bandura (1986) studied the integration and collaboration of learning experiences, despite individual differences. The emphasis on the social, affective, and contextual aspects of learning provided evidence for others to accept Bandura's (1986) theory that learning is a collaborative process. Bandura (1986) assigned an important role to cognitive, vicarious, self-regulatory, and self-reflective processes in learning, viewing learners as self-organizing, self-reflecting, and self-regulating. This opposed earlier views that learners are reactive organisms shaped by environmental forces or driven by impulses. From this new perspective, learning is viewed as the product of a dynamic interplay of personal, behavioral, and environmental influences (Bandura, 1986).

M. C. Smith and Pourchot (2013) later found that collaborative learning parallels patterns of adult moral development, how adults achieve metacognitive skills, and the role of adult beliefs about learning in school, work, and life. The view of how adults learn at school and work, or social context, emphasizes a more unilateral view of learning theory in the way that can be universally applied to all contexts (D. Eaton, 1998; S. E. Eaton, 2010). Zimmerman and Schunk (2001) built on this theory by exploring how people learn in communities, stating that social learning, across all domains, impacts how learners feels about their cognition, behavior, and environment. In other words, the social aspect of learning has the capacity to effect a learner's self-efficacy (Brown, 1997; Brown & Campione, 1990).

Self-Efficacy

The term self-efficacy is synonymous with one's efficacy belief and efficacy perception (Bandura, 1997). Since these terms are used interchangeably in the literature, they will also be used interchangeably in this literature review. Bandura (1977) defined self-efficacy as one's capability to do what is necessary to produce a specific result. It is "the conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1977, p. 193). Zimmerman (2000) succinctly described self-efficacy as a domain measuring the performance of expected outcomes. It is a theoretical cognitive construct that can enable people to predict events and to exercise control over them (Bandura, 1997).

Self-efficacy is not simply a descriptive construct. It is an integral part of social learning theory (Bandura, 1977) and has gained substantial empirical support in its ability to effect student motivation (Baker, 2010; Bolliger, Supanakorn, & Boggs, 2010; Burguillo, 2010; Munoz-Organero, Munoz-Merino, & Kloos, 2010). Although Bandura's (1977) and Zimmerman's (2000) theories on self-efficacy are exhaustive, literature on self-efficacy by other researchers further clarifies the construct (Baker, 2010; Bolliger et al., 2010; Burguillo, 2010; Munoz-Organero et al., 2010).

First, self-efficacy is one's present confidence in one's present ability to perform and not a judgment either of future confidence or of future performance (Bandura, 1977, 1982; Zimmerman, 2000). Bandura (2006) writes that in self-efficacy research, "people are asked to judge their operative capabilities as of now, not their potential capabilities or their expected future capabilities" (p. 313). Bandura (1977) makes the distinction that people must judge their current capabilities because "it is easy for people to imagine themselves to be fully efficacious in some hypothetical future" (p. 313). Hoorens (1993) identified this bias as the illusory superiority effect, whereby we believe we can accomplish something because we expect to be better at it in the future. For example, a student may judge their ability at calculus to be high because they enrolled a calculus class next year. The illusory superiority effect can impact a learner's self-efficacy by allowing them to have unrealistic expectations of their abilities (Hoorens, 1993).

Second, self-efficacy also relates to one's perceived capability, not one's intention to perform (Bandura, 1977, 1982; Zimmerman, 2000). Efficacy beliefs are naturally a major determinant of one's intention, but these are different constructs, both conceptually and empirically (Bandura, 1977). Bandura (2006), therefore, directs that efficacy measurements clearly reflect this distinction, stating that "the items should be phrased in terms of can do rather than will do. Can is a judgment of capability; will is a statement of intention" (p. 303). In other words, the fact that one is able to do something does not mean that one intends to carry out the act.

Third, self-efficacy is not an evaluation of one's skills, but rather a judgment of one's ability to employ one's skills (Bandura, 1977). There are reasons why one might not be able to employ one's skills such as a lack of self-regulation, physical barriers, or a challenged emotional state (Bandura, 1977). Bandura (1997) demonstrated that having a skill is not as important as having the knowledge of what you can do with that skill. Ability and self-efficacy are, in turn, conceptually and empirically distinct constructs, although they are very closely related.

Fourth, Bandura (1977) distinguished between an outcome expectation and an efficacy expectation. An outcome expectation is defined as a belief that a certain effect would result from one's course of action (Bandura, 1977). An efficacy expectation is defined as one's belief that they have the ability to execute a course of action (Bandura, 1977). Bandura (2012) summarized the relationship between efficacy expectations and outcome expectations by stating that any expectation about an outcome depends heavily on one's "judgment" (p. 309) of how well they performed the task, instead of whether or not they could complete it at all. For example, a 2004 study found that people who expected a lack of physical activity in the workplace viewed their activity level negatively, even though the same activity level was viewed positively by people who did not expect a lack of physical activity in the workplace (Prodaniuk, Plotnikoff, Spence, & Wilson, 2004).

Lastly, efficacy beliefs are domain specific, and according to Bandura (1977), general self-efficacy does not exist. Bandura (2012) explained that self-efficacy is inherently specific and varies according to each human endeavor. Hence, people differ in the areas and extent of their self-efficacy. For example, if a student has high self-efficacy for learning math and science, low self-efficacy for music, and a moderate self-efficacy for writing essays, there is no way to measure a "general sense of self-efficacy" (Bandura, 2012, p. 20). Bandura (2006) has therefore insisted "scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest" (p. 306). He notes that precise judgments of capability paired with specific outcomes both yield the best predictions and offer the best explanations of performance (Bandura, 1986). This was confirmed by the meta-analysis of Multon, Brown, and Lent (1991), who found that specific measures of self-efficacy paired with corresponding performance measures produced the most significant predictive results.

Academic Self-Efficacy

A student's engagement in learning is a foundation to academic achievement (Caraway, Tucker, Reinke, & Hall, 2003). A student's self-efficacy in an academic task is one of the most significant predictors to engagement because it determines what task students attempt to complete, the amount of effort they put into the task, their persistence, and the perseverance they will put toward the task (Caraway et al., 2003). Further, Panunonen and Hong (2010) demonstrate that academic self-efficacy determines the amount of energy a learner spends on accomplishing the task, how easily they are distracted from the task, how well they deal with the stress associated with the task, and how much they are affected by fatigue associated with the task. The more competent a student feels in an academic task the more effort s/he will show (Caraway et al., 2003). When students develop a strong sense of self-efficacy, they perform at a much higher level (Bandura, 1997). A study conducted by Caraway et al. (2003) found that students with a high grade point average had a higher self-efficacy and were engaged in class activities more than students with a lower self-efficacy. Researchers across disciplines have found that both a significant relationship exists between academic success and academic self-efficacy, and that self-efficacy is a positive predictor to achievement (Bandura, 1997; Caraway et al., 2003; Paunonen & Hong, 2010).

Social Self-Efficacy

Smith and Betz (2000) define social self-efficacy as “an individual’s confidence in their ability to be comfortable in the social interactional tasks necessary to initiate and maintain interpersonal relationships” (p. 286). One’s social self-efficacy is influenced by several factors, including perceived social skills, self-image, perceived commonalities among members of social groups, and verbal aggressiveness (Martínez-Martí & Ruch, 2017; Savage & Tokunaga, 2017). These factors have been shown to directly correlate to one’s emotions, create negative emotions surrounding social interactions when the factors are low and positive emotions when they are high (Martínez-Martí & Ruch, 2017; Savage & Tokunaga, 2017).

The link between social self-efficacy and emotional environment has been explored for decades (Bandura, 1997; Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003; Feichtner & Davis, 1984; Martínez-Martí & Ruch, 2017; Savage & Tokunaga, 2017). In 2003, researchers stated that social self-efficacy is directly impacted by one’s external environment (Bandura et al., 2003). According to Bandura et al. (2003), "Unlike the often discordant and divisive effects of negative affect, positive affect promotes social connectedness and bonding" (p. 770). Positive social experiences can enhance cognitive functioning and, therefore, one's ability to learn (Bandura et al., 2003). Bandura et al. (2003) summarize this concept by stating that academic factors, such as achievement, can be positively affected by social factors, such as good relationships with other learners. Further, these social factors are influenced heavily by the behaviors of those in the external environment (Bandura et al., 2003). According to Erozkan and Deniz (2012), this includes social behaviors such as dealing with conflict, making new friends, and demonstrating assertiveness in group settings. An individual's ability to interact in a group setting is directly tied to personal success, and individuals differ in their ability to feel comfortable in social interactions (Erozkan & Deniz, 2012).

In general, a person's perceived social self-efficacy reflects their level of social confidence (Erozkan & Deniz, 2012). In a study on self-efficacy, Erozkan and Deniz (2012) explored how learners' self-efficacy was effected by participation in specific afterschool activities and academic programs. Erozkan and Deniz (2012) concluded that a significant relationship exists between a high social self-efficacy, critical thinking, and resourcefulness in certain courses. As other researchers have concluded that critical thinking and resourcefulness can be improved through the use of technology in the classroom (Branch, 2015; Butler et al., 2014), this study will investigate if a relationship exists between technology usage and social self-efficacy.

Emotional Self-Efficacy

People vary in how successfully they “manage their emotional experiences in everyday life and the manner and degree to which they regulate their emotions likely depends, in part, on how they appraise their affective experiences” (Caprara, Di Giunta, Pastorelli, & Eisenberg, 2013, p. 106). Self-efficacy beliefs are critical because they directly impact what control individuals believe they have over an entire emotional experience (Bandura et al., 2003). In the past few years, there has been significant increase in the amount of literature on the impact prolonged emotional self-efficacy, or emotional resilience, has on learning (Hewitt, Buxton, & Thomas, 2017). In one study, Hewitt et al. (2017) measured the impact that a drama workshop had on students roleplaying situations that challenged their emotional resilience. The study found that not only did the students’ emotional self-efficacy increase significantly when given the opportunity to explore their emotions through acting, but also their academic achievement increased as well (Hewitt et al., 2017). When the students were asked what impact the workshop had on their emotional self-efficacy, they indicated that it had enabled them to be more effective in self-evaluation and reflection, feeling less isolated and having more self-awareness (Hewitt et al., 2017).

In the past 15 years, many researchers have concluded that a relationship exists between learning and emotional self-efficacy, specifically the experiences that drive emotional self-efficacy (Alfassi, 2003; Caprara et al., 2013; Niditch & Varela, 2012). Emotional experiences can significantly impact one’s level of stress and anxiety, which in turn impacts intellectual functioning (Alfassi, 2003). A study by Niditch and Varela (2012) examined the influence of emotional self-efficacy on middle and high school students’ anxiety levels and concluded that emotional self-efficacy significantly impacted student achievement. A review of the literature reveals many researchers that have found a significant relationship between academic achievement and emotional self-efficacy (Alfassi, 2003; Caprara et al., 2013; Niditch & Varela, 2012).

Technology

Since 2000, a number of studies have been conducted to assess the effectiveness of integrating technology in the classroom (Kirkwood & Price, 2014; Kleiman, 2004; Liu & Szabo, 2009; Swan, Hooft, Kratcoski, & Unger, 2005). Educators across domains have attempted to use pieces of technology as the universal answer for solving numerous problems that exist with teaching and learning in schools (Liu & Szabo, 2009). A prominent figure in the discussion of how educational technology can help improve learning is Benjamin Bloom (as cited in Clark, 2010). Although the integration of technology was not the main focus of Bloom's "Taxonomy of Educational Objectives," his popular findings on mastery learning and one-to-one tutoring have influenced the mission of instructional technologists (as cited in Clark, 2010). Bloom demonstrated that one could achieve the same successful results while removing the physical mentor from a one-on-one learning environment, replacing it with a virtual stand-in (Bloom, 1956). In addition, integrating technology opened up new ways to educate students, such as interactive media, online quizzes, and message boards (Kirkwood & Price, 2014).

Due to the new opportunities that technology could provide, integrating technology became the goal of some curriculum committees in K-12 (Kleiman, 2004; Swan, 2003). Swan et al. (2005) concluded that technology could significantly increase student motivation and engagement levels during formal and informal learning, in turn, producing higher quality work in the classroom. Kleiman (2004) emphasized, "Research needs to consider not just the technology but rather the educational value of technology-enhanced or technology-integrated instructional practices, in contexts that enable teachers to have the training, support, and resources to successfully implement those practices" (p. 4). The research of Peng, Su, Chou, and Tsai (2009) explored the outcomes of integrating technology by using constructivist principles to engage students in a learning environment. Peng et al. (2009) found that the leading challenge to technology's use in the classroom was student engagement and, according to researchers, a student's engagement can be influenced by their environment (Eccles & Wigfield, 1985).

The classroom environment, before technology's integration, was dominated by expectations about instructing and measuring achievement, behavior, and interpersonal communication (Eccles & Wigfield, 1985). In this environment, a high level of engagement most often equates to a high level of achievement (Eccles & Wigfield, 1985). After technology's integration, the culture and traditional perception about what constitutes an appropriate classroom environment changed (Eccles & Wigfield, 1985). Using educational technology became viewed as a classroom necessity more than extracurricular, and teaching technology skills became required curricula (Alsufi, 2014; Bitter & Pierson, 2001). The appropriate classroom environment today is dominated by expectations about technical aptitude and online social presence (Eccles & Wigfield, 1985). In this environment, a high level of engagement does not necessarily equate to any achievement at all (Eccles & Wigfield, 1985). Fijor (2010) identified this cultural shift, suggesting that students using technology to communicate with each other might appear to be highly engaged in learning to the outside observer, but may not be engaged in learning whatsoever or to only a small degree. Instead, the learner may be focusing on overcoming knowledge gaps in order to use the technology or exploring uses for the technology that fall outside the scope of the learning assignment. Many researchers believe that the openness of technology too easily distracts students and teachers from the learning purpose of which it was intended (Wood et al., 2012; Young, 2004). Fijor (2010) concluded that it was essential to evaluate and discriminate between the levels of engagement and the role it plays in the learning process.

Efforts have been made by researchers and educators to define a unified process by which elements of technology integration could be addressed to prevent these challenges. Kearsley and Shneiderman (1999) suggested that institutions themselves need to become deeply familiar with the technologies students are using outside the classroom to ensure proper use, engagement, and evaluation of technology rich learning environments inside the classroom. Their research on student engagement involves a framework of engagement related to technology integration (Kearsley & Shneiderman, 1999). In this framework, students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. Although engagement does not require technology, Kearsley and Shneiderman (1999) suggest that it can be an effective way to achieve this level of engagement. They defined how technology could actively achieve this by utilizing "(a) an emphasis on collaborative efforts; (b) project-based assignments; and (c) a non-academic focus for engaging students in learning that is creative, meaningful, and authentic" (Kearsley & Shneiderman, 1999, p. 23). Kearsley and Shneiderman (1999) also state that a virtual learning environment, e-learning, can drive these experiences by creating an environment in which students are intrinsically motivated through the meaningful nature of a communal learning experience.

Due in part to Kearsley and Shneiderman (1999), online learning has evolved drastically over the past 10 years to emphasize a greater communal learning experience through games, simulations, and other technologies (Akilli, 2007). In addition, research shows that online learning will continue to be dominated by innovations in technology (Stephenson, 2001). These technologies can have a universally beneficial impact in engaging the learner. Downes (2010) stated this when discussing the impact of technology on education:

> In addition to providing an engaging and immersive environment for student learning, substantially improving motivation and interaction with the learning material, games and simulations are able to support learning in complex environments, offering a subtlety simple instruction-based or lecture-based learning cannot offer. (p. 28)

Downes (2010) explained that creating an environment where cause and effect or right and wrong can be challenged without risk, greatly increases one's desire to learn and synthesize complex information.

Throughout literature and historical experience, terms denoting the ability to create virtual learning vary by industry and region. Such terms include e-learning, online learning, web-based education, virtual learning environment, and distance education, all of which can be used interchangeably depending on the context (Mason & Rennie, 2006). Rossett (1999, 2002) defines the concept of e-learning as a connection between the learner and educational content facilitated by hardware, software, or both. Some, but certainly not all, carry deeper connotations of utilizing a global network, mainly the Internet. According to Wang, Haertel, and Walberg (1993), content delivered over the Internet, intranet, or connected network, enhances learning through the ability to integrate audio, video, and other elements through a collaboration of hardware, software, and personnel. Hardware and software aside, learning in a web-based environment requires an intermediary application to facilitate the organization and transference of information, often supplemented by blogs, wikis, games, social networking, or third-party media (Wang et al., 1993).

As the percentage of Internet users has increased, the utilization of online learning has grown substantially, both in the United States (US) and abroad (Nagel, 2010). The research firm, Ambient Insight, published a worldwide market forecast and analysis report for 2010-2015, which stated that North America is the largest consumer of e-learning alternatives, driven primarily by higher education (Collins & Halverson, 2009; Downes, 2010). However, as online learning opportunities become more widespread, many countries are leaning toward more web-based educational models (Nagel, 2010) in both higher education and organizational training. Asia, for example, is forecasted to surpass the United States in e-learning within the next decade (Nagel, 2010).

Technology and Cognitive Overload

In recent years, considerable debate has surrounded the value of utilizing technology in the learning process and the degree to which it could influence learning (R. E. Clark, 1994; Kozma, 1994). Hannafin and Land (1997) explored the potential of learning with technology as a tool, citing that it can provide a deeper experience of learning through media. In their research, Hannafin and Land (1997) extrapolate that video content can make it easier for learners to synthesize information by creating a virtual environment that is more identifiable for the learner. For example, studies have shown that language learners have greater achievement when shown the context, moth movement, and speech pattern through video or other media platforms (Gee, 2003; Saito & Akiyama, 2017; Secules, Herron, & Tomasello, 1992).

Many researchers have demonstrated that learner engagement technology is key to its potential and successful use (Dick & Johnson, 2002; Fijor, 2010; Fisher, 2010; Goldman, Lawless, Pellegrino, & Plants, 2005). However, R. M. Keller (1988) and J. M. Keller (1983) emphasized that technology itself cannot make learners more engaged, although technology has ways of approaching both intrinsic and extrinsic motivators through course design. Cairncross and Mannion (2001) explored growing evidence that the potential of interactive multimedia is not being fulfilled because a user-centered approach to integrating technology is often not considered. Learning technology using general human-computer interaction principles, as well as educational theory, has the power to intrinsically motivate, self-regulate, and enhance learning experiences (Cairncross & Mannion, 2001). Ally (2004) and Laurillard (2007) state that technology can impact learning intrinsically through providing a greater personalization to learning experiences and can increase productivity through more efficient content distribution and assessment. However, opponents to the statement that technology can impact learning have stated that media and online instruction is only a vehicle capable of delivering content (R. E. Clark, 1983). In other words, technology is incapable of influencing how people learn because the distribution of learning material does not affect whether people absorb the content (R. E. Clark, 1994). For instance, according to some researchers, reading a book on a mobile device or in print does not affect the absorption of the content (Höppner, Horstmann, Rahmsdorf, van der Velde, & Ernst, 2009).

Nevertheless, some researchers believe that technology can influence learning (Albion, 1999; Bandura, 2012; Bitter & Pierson, 2001; Brown, 2011; Brusca, 1991; Collins & Halverson, 2009; Dick & Johnson, 2002; Downes, 2010; Fijor, 2010). One of the best ways that technology can aid in the learning process is through sheer, formal organization and customization of the learning experience (Heo & Chow, 2005). Heo and Chow (2005) conducted a study to measure the impact of an e-learning tool on learning and assessment by minimizing the cognitive load. In their study, they monitored three different types of cognitive loads: intrinsic cognitive load, which occurs from the perceived complexity of the material; extraneous cognitive load, which is derived from a complexity of the content's design or materials; and germane cognitive load, which develops as a result of an abundance of mental processing (Heo & Chow, 2005). The results showed that e-learning tools were able to decrease all three types of cognitive overload by putting the learning in the hands of the learner, who knows his/her own limitations. In essence, e-learning tools allow better control over personalized, self-directed, and self-regulated learning.

The Nexus of Self-Efficacy and Technology

There are two main areas in the literature where self-efficacy and technology overlap (see Figure 2). One is that technology provides a great deal of contextual information to the learner (Tennyson & Barron, 1995) and self-efficacy develops in a highly contextual learning environment (Bandura, 1977, 1982). Tessmer and Richey (1997) conducted research on the role of context in learning and instructional design and found that context is essential for self-efficacy to develop. The other is that factors influencing self-efficacy, as defined by Bandura (1977), can also be influenced by the use of educational technologies. Bandura (1977, 1982) defines those influential factors as mastery, vicarious experiences, verbal persuasion, and affective states.

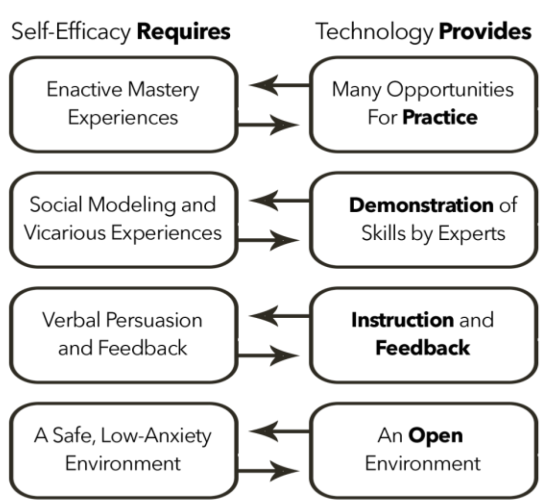

Figure 2.1 The nexus of self-efficacy and technology

Mastery

Bandura (1977) defines mastery as being able to consistently replicate successful performance accomplishments. For instance, one is much more likely to report higher self-efficacy if one has been successful in previous performance accomplishments (Bandura, 1977). In their research, Bandura, Adams, Hardy, and Howells (1980) reported that "both the level and strength of efficacy were substantially boosted by the enactive mastery treatment" (p. 58). However, if one's past experiences have been unsuccessful, one's efficacy beliefs should be correspondingly lower, particularly if a failure occurs before a firm efficacy belief is established (Bandura, 2006). For example, one is unlikely to have high self-efficacy in driving a car if they have only tried it a few times and the most recent time ended in a crash.

Vicarious experiences

Efficacy increases when one witnesses the successful performance of others or through direct skill training (Bandura, 1977). Several variables mediate the effect of vicarious experiences on self-efficacy. For example, efficacy and confidence increase if one perceives some similarity to an observed model or if one observes a variety of different models performing successfully. According to Erozkan (2013), learners are more likely to see barriers as challenges to be conquered than as barriers to be avoided when they have confidence in their problem-solving abilities. For example, if one has high self-efficacy in driving a sedan, it is likely that driving a sports car would be seen as an exciting challenge. Erozkan (2013) states that learners with developed communications skills and interpersonal problem-solving skills are more likely to view themselves as having high social self-efficacy. Efficacy also increases if a model demonstrates coping behaviors and overcomes difficulties, as opposed to mere "facile performances by adept models" (Bandura et al., 1980, p. 2). In activities that cannot be witnessed directly, such as thought activities, efficacy can be increased vicariously by means of models verbalizing their tacit thought processes (Schunk, 1991; Schunk & Hanson, 1985). For instance, Alterio and McDrury (2003) concluded that in education, telling stories of how other individuals overcame obstacles by using a specific thought process, positively affected a student's confidence in that process. These vicarious experiences give learners the ability to learn from the outcomes of other's experiences without having to experience it themselves (Alterio & McDrury, 2003).

Verbal persuasion

One can be persuaded to act by the persuasion of another (Bandura, 2006). The credibility and competence of a persuading agent plays an important role in influencing self-efficacy. Verbal persuasion is perhaps the most commonly used influential factor of self-efficacy because of the ease and efficiency of applying verbal treatments (Lent, Ireland, Penn, Morris, & Sappington, 2017). For example, a credible expert can create self-efficacy in a motivated individual by explaining the steps necessary to obtain expertise or mastery. A study by Cassidy and Eachus (2000) found that students who received motivation from a teacher or peers not only scored higher on achievement tests, but also had greater self-efficacy. Persuasive words can directly impact both a student's motivation and self-efficacy treatments (Lent et al., 2017).

Affective states

When students perform, they evaluate their emotional state, mood, levels of stress, pain, and fatigue (Lent et al., 2017). In general, people have less expectation of success when they are in a state of aversive arousal (Bandura, 1997). However, there is not a simple linear relationship. Though a high level of aversive arousal tends to lower self-efficacy and weaken performance, a moderate level of anxiety and emotional arousal can actually increase self-efficacy as well as boost attention, facilitate the use of skills, and improve performance (Bandura, 1997). Further, a student's emotional state can impact other factors related to performance. One's affective state can significantly impact one's level of stress and anxiety, which in turn impacts achievement (Alfassi, 2003). Niditch and Varela (2012) concluded that a learners affective state can significantly impact student achievement by causing stress, distraction, and a lack of self-awareness and motivation. Several studies have concluded that a significant relationship between academic achievement and learner emotional state exist (Alfassi, 2003; Caprara et al., 2013; Niditch & Varela, 2012).

Conclusion

Self-efficacy is a useful construct in education and educational research because it is both a variable that is easily measured and a strong predictor of success in completing learning outcomes (Bandura, 1997). Bandura (1977) describes self-efficacy in learning as one's belief in his/her ability to complete a task. As a central component of social cognitive theory, self-efficacy can help direct the path to achieving successful learning outcomes. Self-efficacy, due to its role in human behavior, functioning, performance, and cognitive development, is increasingly being regarded as a successful learning outcome. Research on this topic concludes that one's self-efficacy can be affected by the tools and the environment one uses to learn (Sternberg & Kolligian Jr, 1990). Few would dispute that technology has become one of the fastest growing tools teachers have adopted to drive student achievement (Kirkwood & Price, 2014; Kleiman, 2004; Liu & Szabo, 2009; Swan et al., 2005). Technology has rapidly become an integral instrument in the learning experience (Kleiman, 2004; Swan, 2003). Although literature in the development of self-efficacy and the use of instructional technology suggest that a relationship may exist between these constructs, little research has been done to investigate this connection.

CHAPTER III

METHODOLOGY

The purpose of this study was to examine the relationship between three divergent approaches to integrating technology in learning (i.e., technology averse, technology enhanced, and technology integrated) and the perception of three modes of learner self-efficacy (i.e., academic, social, and emotional). Through the use of a specialized measure of self-efficacy developed by Peter Muris (2001) and a measurement of technological competence developed by the researcher, the study aimed to uncover if a relationship existed between how classrooms approaches the integration of technology and how students view their own academic, social, and emotional self-efficacy. The study used quantitative comparative analysis, as outlined in *The Practice of Social Research* (Babbie, 1998), to define those relationships and provide direction for future research. This chapter opens with a description of the methods for the study, including descriptions of the participants, measures, and procedures. Finally, this chapter will conclude with an outline of the planned data analysis.

Method

In the course of this study, survey data were collected in order to explore potential relationships among several variables. This study defined four primary research questions (RQ):

(1) Is there a significant difference in self-efficacy between students in schools with divergent approaches to technology?

(2) Is there a significant relationship between students' self-efficacy scores and their level of self-reported technological competence?

(3) Is there a significant difference in self-reported time spent using technology between students in schools with divergent approaches to technology?

(4) Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology?

To address the research questions, the researcher administered two survey instruments. The first instrument, the Institutional Technology Integration Survey (ITIS), was developed by the researcher and was given to the teachers and administrators of schools involved in the study in order to later categorize each individual classroom's strategic use of technology into the three categories discussed earlier (i.e., technology averse, technology enhanced, and technology integrated); see Appendix A. The second instrument is a self-assessment that was given to students participating in the study and involves two parts administered together. The first part is a survey entitled the Self-Efficacy Questionnaire for Children (SEQ-C) and was used to address the first and second research question (Muris, 2001). The SEQ-C (Appendix B) measures engagement in three subscales defined by Muris (2001) as academic, social, and emotional self-efficacy (Table 3.1).

Table 3.1 Breakdown of Subscales for the SEQ-C

Subscale	Strategy	Number of Items
1	Academic Self-Efficacy	8
2	Social Self-Efficacy	8
3	Emotional Self-Efficacy	8

The identified technological approach and scores from each of the SEQ-C subscales were analyzed to determine if a relationship exists between the variables. In order to individually address each of the subscales identified by Muris (2001), RQ1 was separated into the following three sub questions:

a. Is there a significant difference in average academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse schools?
b. Is there a significant difference in average social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse schools?
c. Is there a significant difference in average emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse schools?

The second part is a self-assessment developed by the researcher to determine a learner's perceived technological competence (Appendix C) and was used to address RQ2, RQ3, and RQ4. This self-assessment, called the Technological Competence Questionnaire for Children (TCQ-C), asked several Likert-style questions. For RQ2, a score based on perceived technological competence from the TCQ-C and the SEQ-C scores were analyzed to determine if a relationship between these variables exist. In order to individually address each of the subscales identified by Muris (2001), the RQ2 was also divided into the following sub questions:

a. Is there a significant relationship between students' average academic self-efficacy scores and their level of self-reported technological competence?
c. Is there a significant relationship between students' average social self-efficacy scores and their level of self-reported technological competence?
d. Is there a significant relationship between students' average emotional self-efficacy scores and their level of self-reported technological competence?

To address research question three, the TCQ-C also collected data on students' perceived time spent using technology both inside and outside of the classroom. The study analyzed students' perceived time spent using technology and the classrooms approach to integrating technology to determine if a relationship exists between the two variables. To address RQ4, the study analyzed students' perceived time spent using technology and perceived technological competence to determine if a relationship exists between those variables.

Description of the Population and Sample

The population for this study consisted of administrators, teachers, and students from junior high schools in two school districts in southeast Tennessee. The population included students at the sixth, seventh and eighth grade levels. After the instruments were administered to those participating from the survey population, a sample was chosen from the responses for data analysis in this study. The sample in this study was selected to represent a balance of all technological approaches, socioeconomic characteristics, and learner demographics. Each classroom's approach was determined by evaluating responses to the ITIS given to teachers and the researcher's observation of technology use.

As a result of each school in the sample being chosen by the researcher (Creswell, 2002; Fraenkel & Wallen, 1993; Rea & Parker, 2012), the research findings are not statistically generalizable to all schools and students. However, Stake and Savolainen (1995) have advocated naturalistic generalization as a means of applying research and experience from one case study to similar cases through the use of human wisdom and judgment. The findings of this study might be applied by educators to both secondary education and higher education classrooms with similar approaches to integrating technology in learning.

The purpose of the study and data collection procedure were clearly communicated by the researcher to prospective respondents and their parents in an authorization letter sent home with each child. In order to gain consent, each parent who wanted their child to participate was required to sign the informed consent letter prior to participation. In addition, each student who wanted to participate was required to turn in the informed consent letter signed by a parent and, themselves, sign a separate informed consent roster sheet provided by the teacher on the day of administration. Participation in the study was voluntary. The Institutional Review Board (IRB) evaluated all aspects of the study and all records related to the participants were kept secured and confidential. No advantage was gained or lost by students or parents choosing to participate in the study.

Data Collection Instruments

The ITIS used in this study is a qualitative survey instrument provided during an initial meeting with school administrators and teachers. The questions in this survey were used to categorize classrooms into one of three approaches, technology averse, technology enhanced, or technology integrated. In addition, the researcher validated the responses to the survey questions with observations of instructional technology in use.

The primary data instrument that was used for this study contains two sections. The first is a questionnaire entitled the Self-Efficacy Questionnaire for Children (SEQ-C) and it was used to determine a learner's self-efficacy in the three areas being studied. The second is a series of questions entitled the Technology Competence Questionnaire for Children (TCQ-C) and was designed to determine the participant's perceived technological competence. Both sections were administered in a single instrument.

SEQ-C

The first section, the SEQ-C, assesses three main areas of self-efficacy: academic, social, and emotional. The first, academic self-efficacy, refers to children's perceived capability to master academic affairs. The second, social self-efficacy, pertains to children's capability to deal with social challenges. The third, emotional self-efficacy, refers to children's capability of resisting peer pressure to engage in high risk activities. As a part of the primary instrument, some questions were added to self-assess the technological competence of each learner (Appendix C).

Scoring

Each domain was measured through eight questions that were scored on a 5-point Likert scale with one being “Not at all” and five being “Very well.” The selections two, three, and four on the scale are different levels of measurement, but there were no stated descriptors for the values since the instrument was be modified from its original version. Scores for the individual scales were standardized by dividing the total score for the scale by the number of items that comprise the scale. For instance, the academic self-efficacy scale is composed of eight items. Adding these eight items and computing the mean would calculate a participant’s score.

In addition, the questions added by the researcher included four Likert-style questions developed by the researcher to assess the participants’ perceived level of technological competence (Appendix C). These questions were piloted with a similar group of students at another school to establish survey validity before being integrated with the SEQ-C assessment and delivered simultaneously with the SEQ-C survey administration during the study.

Instrument reliability and validity

According to Fink and Litwin (1995), reliability refers to the “accuracy (consistency and stability) of measurement by a test. This is determined by retesting an individual with the same test” (p. 32). According to Fink and Litwin (1995), validity indicates “the degree to which the test is capable of achieving certain aims” (p. 32). In other words, does the test measure what it intends to measure? Both reliability and validity are vital to an effective research instrument (Fink & Litwin, 1995).

For the SEQ-C, Muris (2001) completed a number of statistical tests to determine the reliability and validity of the SEQ-C instrument, using data from their sample of 330 students. The analysis yielded a Cronbach’s Alpha reliability coefficient of .88 for the total self-efficacy scale and between .85 and .88 for the subscale scores. Several other researchers have since tested the validity and reliability of the SEQ-C (Landon, Ehrenreich, & Pincus, 2007; Lofgran, 2012; Suldo & Shaffer, 2007) and found validity and reliability to be significantly high. According to Muris (as cited in Moree, 2010), “The scale has been shown to demonstrate good construct validity via strong correlations with Muris, Schmidt, Lambrichs and Meesters’ (2001) Negative Attributions Questionnaire and Bijstra, Jackson, and Bosma’s (1994) Coping List measure” (p. 25). Also, in a study by Suldo and Huebner (as cited in Moree, 2010), the SEQ-C was found to have an internal consistency reliability of .82 for the academic subscale, .78 for the emotional subscale, and .76 for the social subscale. The assessment has also been found to be independently reliable by the U.S. Department of Labor and has been used to assess national samples of youth since 1986 (Moree, 2010).

TCQ-C

The second instrument, Technology Competence Questionnaire for Children (TCQ-C), contains six questions chosen to collect information on a learner’s self-reported technological competence. The first two questions determine the learner’s gender and current grade level, which are factors that are found to influence technological competence due to the differences in development between grade levels and gender (Sanders, 2005; S. D. Smith, 1987). The second two questions determine the amount of time a student uses technology in and out of the classroom. The amount of time a learner uses technology significantly impacts how much the learner perceives the technology influences them (R. Christensen, 2002). The fifth and sixth questions explore one’s comfort with teaching technology to others, concluding a deeper synthesis of using technology (Cortese, 2005; Entwistle, 2000).

Scoring

A student's perceived technological competence was scored by calculating the sum of the numerical values selected for questions three and four. In addition, a weighted arithmetic mean was calculated using the two numbers to assign more importance to one's perceived comfort teaching technology and less to comfort using technology. The sum of question four was weighted by a factor of .25, while the sum of question three was not weighted. The resulting sum was the learner's technological competence score. Questions one, two, five, and six were not used in the score. However, they were used for other research questions or as extraneous variables for determining areas for future research.

Instrument reliability and validity

The questions from the TCQ-C was piloted with a small sample group of middle school students from a school located in Tennessee. The pilot school was similar to those involved in the study based on its student population, subjects taught, and relative test scores. During the pilot administration, the survey was given, and each student was asked clarify the meaning of each question. The pilot answers were evaluated to ensure that the questions were clear and consistently understood. Based on the responses in the pilot, the TCQ-C was easily understood and no modifications to the instrument were necessary to improve clarity.

Data Collection Procedures

The study utilized the SEQ-C to capture the participant's academic, social, and emotional self-efficacy. In addition, questions created by the researcher were added to measure technological self-competence and time spent using technology inside and outside of the classroom. The teachers involved in the study administered the SEQ-C and the TCQ-C together as one instrument in a regularly scheduled classroom session during the school year. In order to receive the survey instrument on the day of administration, each student was required to turn in the informed consent letter signed by a parent and, then, sign an informed consent roster provided by the teacher. The roster tracked students names, signature, the teacher's unique ID number provided on the ITIS for each individual teacher, and the unique ID printed on the top of each paper instrument. This roster allowed the researcher to verify two things. First, the researcher used the roster to verify that each student who was given an instrument had an informed consent letter signed by a parent on file. Second, the researcher used the roster to verify that each returned survey instrument was taken by a student in the correct classroom. Post verification, the data was screened to ensure responses were complete using standard practice defined by Creswell (2002). In addition, the roster provided a unique ID for each student, or record, which allowed the analysis of the survey to continue anonymized once the results were digitized into a structured query language (SQL) database. To further ensure proper security and anonymization, the digitization was completed by an independent third-party, not connected to the study, and all paper documents were kept locked and separated from the anonymized data.

Data Analysis Strategies

Data collected from the ITIS was used by the researcher to categorize each teacher's classroom into one of the three approaches to integrating technology. Then, the data collected from the primary instrument was sorted by classroom and the representative sample was chosen for analysis using the methods discussed earlier. The data collected from the sample was analyzed via the Statistical Package for Social Science (SPSS) version 23 program to address the research questions in a variety of ways. For RQ1, a univariate analysis of variance (ANOVA) was used to investigate the differences between the self-efficacy score means and the three approaches to integrating technology. Specifically, the variation of the dependent variable, self-efficacy scores among the responses in the SEQ-C, was compared with the variation of the independent variable, categorical approach to integrating technology (Black, 1999) as defined in the research questions (Appendix D). For RQ2, a Pearson correlation was used to investigate the relationship between the self-efficacy score and a student's perceived technological competence, as defined in the research questions (Appendix D). For RQ3, a Chi-square test of independence was used to determine if a relationship exists between the approach of integrating technology in the classroom and time spent using technology inside and outside of the classroom. Specifically, self-reported technology usage inside and outside of school was separated and labeled into three groups; high (>3), low (<3), and midline (3). Data from measuring the dependent categorical variable, the approach to integrating technology, and the independent categorical variable, amount of time spent using technology, were analyzed to determine if a relationship exists between the two variables, as defined in the research questions (Appendix D). For RQ4, a Pearson correlation was used to investigate the relationship between perceived time spent using technology inside and outside of school and a student's perceived technological competence, as defined in the research questions (Appendix D). All of the analysis strategies discussed in this chapter are summarized in Table 3.2.

Table 3.2 Tests Performed with SPSS

Research Questions	**Test Performed**
Is there a significant difference in mean academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?	One-way ANOVA

Is there a significant difference in mean social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?	One-way ANOVA
Is there a significant difference in mean emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?	One-way ANOVA
Is there a significant relationship between students' mean academic self-efficacy scores and their level of self-reported technological competence?	Pearson (r) product-moment correlation
Is there a significant relationship between students' mean social self-efficacy scores and their level of self-reported technological competence?	Pearson (r) product-moment correlation
Is there a significant relationship between students' mean emotional self-efficacy scores and their level of self-reported technological competence?	Pearson (r) product-moment correlation
Is there a significant difference in self-reported time spent using technology inside school between learners in technology enhanced, technology integrated, and technology averse classrooms?	a Chi-square test of independence
Is there a significant difference in self-reported time spent using technology outside of school between learners in technology enhanced, technology integrated, and technology averse classrooms?	a Chi-square test of independence
Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school?	Pearson (r) product-moment correlation
Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside school?	Pearson (r) product-moment correlation

Summary

Current research has not definitively answered whether technology impacts the learner positively or negatively (Brusca, 1991; Cassil, 2005; Cuban & Cuban, 2009; Kulik, 2003; Li & Ma, 2010; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002). However, the majority of research completed focuses on achievement to determine the relationship between technology and learning (Strong, Torgerson, Torgerson, & Hulme, 2011; Torgerson et al., 2004; Waxman, Connell, & Gray, 2002). Even though self-efficacy is not a performance measure, decades of research has concluded that high learner self-efficacy is significantly correlated to high learner acheivement (Bandura et al., 2001). Futher, research suggests that technology has the capability of impacting self-efficay depending on the approach to how it is used (Chen, 2008; King, 2002). Three types of self-efficacy have been found to correlate with learner achievement: academic, social, and emotional self-efficacy. This study addresses the effect that different approaches to implementing technology had on each type of self-efficacy. The data for this study was collected utilizing a self-report survey that measures an individual’s self-efficacy and their perception of technology in the classroom. The results of the instrument were verfied, digitized, and analyzed using a variety of means discussed in this chapter.

CHAPTER IV

FINDINGS

The purpose of this study is to examine the relationship between three divergent approaches to integrating technology in learning, i.e., technology averse, technology enhanced, and technology integrated, and the perception of three modes of learner self-efficacy, academic, social, and emotional. Through the use of a specialized measure of self-efficacy developed by Peter Muris (2001) and a measurement of technological competence developed by the researcher, the study aimed to uncover if a relationship exists between how classrooms approach the integration of technology and how students view their own academic, social, and emotional self-efficacy.

Research Questions

In the course of this study, survey data were collected in order to address several important questions. This study addressed four primary research questions:

1. Is there a significant difference in self-efficacy between students in classrooms with divergent approaches to technology?
    a. Is there a significant difference in mean academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?

b. Is there a significant difference in mean social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?
c. Is there a significant difference in mean emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?

2. Is there a significant relationship between students' self-efficacy scores and their level of self-reported technological competence?
   a. Is there a significant relationship between students' mean academic self-efficacy scores and their level of self-reported technological competence?
   b. Is there a significant relationship between students' mean social self-efficacy scores and their level of self-reported technological competence?
   c. Is there a significant relationship between students' mean emotional self-efficacy scores and their level of self-reported technological competence?
3. Is there a significant difference in self-reported time spent using technology between students in classrooms with divergent approaches to technology?
   a. Is there a significant difference in self-reported time spent using technology inside school between learners in technology enhanced, technology integrated, and technology averse classrooms?
   b. Is there a significant difference in self-reported time spent using technology outside of school between learners in technology enhanced, technology integrated, and technology averse classrooms?

4. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology?
    a. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school?
    b. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside school?

Null Hypotheses

$H_0$1: There will be no significant difference in mean academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms as indicated by the SEQ-C results.

$H_0$2: There will be no significant difference in mean social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms as indicated by the SEQ-C results.

$H_0$3: There will be no significant difference in mean emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms as indicated by the SEQ-C results.

$H_0$4: There will be no significant difference between students' mean academic self-efficacy scores and their level of self-reported technological competence.

$H_0$5: There will be no significant difference between students' mean social self-efficacy scores and their level of self-reported technological competence.

H_06: There will be no significant difference between students' mean emotional self-efficacy scores and their level of self-reported technological competence.

H_07: There will be no significant difference in self-reported time spent using technology inside school between learners in technology enhanced, technology integrated, and technology averse classrooms.

H_08: There will be no significant difference in self-reported time spent using technology outside of school between learners in technology enhanced, technology integrated, and technology averse classrooms.

H_09: There will be no significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school.

H_010: There will be no significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside of school.

Descriptive Statistics

Demographic Profile of the Sample

The population of the study included two schools, Cleveland Middle School, the middle school in the Bradley County school district with the highest enrollment, and Ocoee Middle School, the middle school in the Cleveland City school district with the highest enrollment. All 39 core-subject teachers in the selected schools were invited to participate in the study and given the Institutional Technology Integration Survey (ITIS). The ITIS was designed to categorize classrooms into three functional groups: technology averse, technology enhanced, and technology integrated. Of the surveys that were distributed, 34 teachers completed the survey, an 87.1% response rate. Of the sample of classrooms, 13 were categorized as technology integrated

(38.3%), 19 were categorized as technology enhanced (55.2%), and two were categorized as technology averse (5.9%). Table 4.1 contains frequency information on classroom categorization for the 34 teachers that participated in the survey.

Table 4.1 Classroom Categorization for Participating Classrooms

Characteristic	**Category**	**Frequency**	**Percent**
Classroom Category	Technology Integrated	13	38.3
	Technology Enhanced	19	55.2
	Technology Averse	2	5.9

A population of 2,426 middle school students from the selected middle schools were invited to participate in the survey. Each student in the population was given a welcome packet including a description of the study and parental authorization forms. Of the welcome packets that were distributed, 383 students returned the signed authorization forms and completed the survey instrument on the day it was administered, resulting in a 15.8% response rate. This section describes the demographic profile of the 383 student participants.

The sample includes 222 female students (58%) and 161 male students (42%). Additionally, 161 students (42.3%) were in the sixth grade, 162 students (42%) were in the seventh grade, and 60 students (15.7%) were in the eighth grade. Table 4.2 contains frequency information on gender attributes for the 383 students that participated in the survey. Table 4.3 contains frequency information on grade level attributes for the 383 students that participated in the survey.

Table 4.2 Gender Characteristics of Participants

Characteristic	Category	Frequency	Percent
Gender	F	222	58.0
	M	161	42.0

Table 4.3 Grade Level Characteristics of Participants

Characteristic	Category	Frequency	Percent
Grade Level	6	161	42.3
	7	162	42.0
	8	60	15.7

Self-Efficacy Questionnaire for Children (SEQ-C) Results

Students who participated in the study responded to 30 questions. The first 24 Likert-style questions were taken from the Self-Efficacy Questionnaire for Children (Muris, 2001). The questions in this section were presented with answers as a range from one to five, with answers being summed to total a score in each of the three types of self-efficacy. Questions 1, 4, 7, 10, 13, 16, 19, and 22 were scored to quantify the participant's academic self-efficacy. For academic self-efficacy, totaled scores for the sample ranged from 12 to 40, with 27 being the mode. Of the students who participated, 147 (38.4%) ranked high in self-efficacy (>31), while six students (1.6%) ranked low (<17). Table 4.4 contains frequency information on academic self-efficacy scores for the 383 students that participated in the survey.

Table 4.4 Academic Self-Efficacy Scores of Participants

Characteristic	Category	Frequency	Percent
Academic	8.00 – 16.00	6	1.6
	17.00 – 31.00	230	60.1
	32.00 – 40.00	147	38.4

Questions 2, 6, 8, 11, 14, 17, 20, and 23 were scored to quantify the participant's social self-efficacy. For social self-efficacy, totaled scores for the sample ranged from 14 to 40, with 29 being the mode. Of the students who participated, 109 (28.5%) ranked high in self-efficacy (>31), while five students (1.3%) ranked low (<17). Table 4.5 contains frequency information on social self-efficacy scores for the 383 students that participated in the survey.

Table 4.5 Social Self-Efficacy Scores of Participants

Characteristic	Category	Frequency	Percent
Social	8.00 – 16.00	5	1.3
	17.00 – 31.00	269	70.2
	32.00 – 40.00	109	28.5

Questions 3, 5, 9, 12, 15, 18, 21, and 24 were scored to quantify the participant's emotional self-efficacy. For emotional self-efficacy, totaled scores for the sample ranged from 8 to 40, with 26 being the mode. Of the students who participated, 62 (16.2%) ranked high in self-efficacy (>31), while 25 students (9.1%) ranked low (<17). Table 4.6 contains frequency information on emotional self-efficacy scores for the 383 students that participated in the survey.

Table 4.6 Emotional Self-Efficacy Scores of Participants

Characteristic	Category	Frequency	Percent
Emotional	8.00 – 16.00	25	6.5
	17.00 – 31.00	286	74.7
	32.00 – 40.00	62	16.2

Questions for each of the three subsets were tested using a Cronbach’s alpha coefficient for internal consistency reliability. Cronbach's alphas for the eight academic self-efficacy items, social self-efficacy items, and emotional self-efficacy items were .85, .77 and .79, respectively. The SEQ-C was found to be highly reliable (24 items; $\alpha = .89$).

RQ1

The first research question asked if there is a significant difference in self-efficacy between students in classrooms with divergent approaches to technology. Sub questions were created in order to address each type of self-efficacy as it related to divergent approaches to integrating technology. The first sub question asked if there is a significant difference in mean academic self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms. The null hypothesis for the first sub question stated that there will be no significant difference in mean academic self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms as indicated by the SEQ-C results.

A one-way analysis of variance (ANOVA) was used to test the null hypothesis to determine if there was a significant relationship between the two variables. An ANOVA, as described by Adams (2018) was chosen because it is used to determine whether there are any statistically significant differences between the means of two or more independent and unrelated groups, in this case the category of technology integration. The ANOVA used to analyze the data is based on the assumptions that the sample population is normally distributed and the variances of said population are equal (Adams, 2018).

The dependent variable for the first sub question is the self-efficacy score concluded by the SEQ-C survey instrument, categorized as addressing academic self-efficacy. Within the study, academic self-efficacy scores for the technologically integrated approach had a mean of 27.90 with a standard deviation of 5.52. Academic self-efficacy scores for the technologically integrated approach had a mean of 30.20 with a standard deviation of 5.35. Academic self-efficacy scores for the technologically averse approach had a mean of 29.56 with a standard deviation of 5.43. The ANOVA model for academic self-efficacy is significant at the .001 level with an F statistic of 6.80 and a df of 2. The full results for academic self-efficacy are presented in Table 4.7.

Table 4.7 Relationship between Academic Self-Efficacy Score and Technological Approaches

Source		***Sum of Squares***	***df***	***Mean Square***	***F***	***Sig.***
Academic	Between Groups	401.954	2	200.98	6.80	.001
	Within Groups	11237.87	380	29.57		
	Total	11639.82	382			

This data demonstrates that academic self-efficacy scores from the SEQ-C do have a significant relationship with the technological approach to integrating technology in the classroom. Since the ANOVA model for academic self-efficacy is significant at the .001 level, the null hypothesis is rejected. Thus, we conclude that there is a relationship between academic self-efficacy and approaches to integrating technology in the classroom.

The Tukey ad hoc test further indicated that the mean between technology integrated classrooms and technology enhanced classrooms (*M* = -2.29, *SD* = .64) was significantly different with a significance of .001 and a confidence interval that does not include zero (*LB* = -3.80, *UB* = -.78). However, the mean between technology integrated classrooms and technology averse classrooms (*M* = -1.65, SD = .71) and the mean between technology enhanced classrooms and technology averse classrooms (*M* = .64, *SD* = .73) were not significantly different. The results of the Tukey ad hoc test are present in full in Table 4.8.

Table 4.8 Tukey Post Hoc Test of Significance for Academic Self-Efficacy

Approach		**Mean Difference**	**Std. Error**	**Sig.**	**Upper Bound**	**Lower Bound**
1	2	-2.29312*	.64313	.001	-3.8064	-.7799
	3	-1.65405	.70772	.052	-3.3193	.0112
2	1	2.29312*	.64313	.001	.7799	3.8064
	3	.63907	.73167	.657	-1.0825	2.3606
3	1	1.65405	.70772	.052	-.0112	3.3193
	2	-.63907	.73167	.657	-2.3606	1.0825

Taken together, these results show that classrooms that integrate technology to the level of being categorized as technology integrated do have a positive effect on a learner's academic self-efficacy. More specifically, our results suggest that students' have a higher confidence in their academic ability because of the way technology is integrated. However, it should be noted that the extent to which a student engages in technology while in the classroom is not considered in this finding.

The second sub question asked was if there is a significant difference in mean social self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms. The null hypothesis for the second sub question stated that there will be no significant difference in mean social self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms as indicated by the SEQ-C results. A one-way analysis of variance (ANOVA) was used to test the null hypothesis to determine if there was a significant relationship between the two variables. The analysis is presented in full in Table 4.9.

The dependent variable for the second sub question is the self-efficacy score concluded by the SEQ-C survey instrument, categorized as addressing social self-efficacy. Within the study, social self-efficacy scores for the technologically integrated approach had a mean of 27.82 with a standard deviation of 5.48; social self-efficacy scores for the technologically enhanced approach had a mean of 28.80 with a standard deviation of 5.05; and social self-efficacy scores for the technologically adverse approach had a mean of 29.13 with a standard deviation of 5.11. The ANOVA model for social self-efficacy is not significant at the .112 level with an *F* statistic of 2.20 and a *df* of 2. This data demonstrates that social self-efficacy scores from the SEQ-C do not have a significant relationship with the technological approach to integrating technology in the classroom. Since the ANOVA model for social self-efficacy is not significant at the .112 level, the null hypothesis cannot be rejected. Thus, we conclude that there is no relationship between social self-efficacy and approaches to integrating technology in the classroom.

The third sub question asked if there is a significant difference in mean emotional self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms. The null hypothesis for the third sub question stated that there will be no significant difference in mean emotional self-efficacy scores between learners in technology integrated, technology enhanced, and technology averse classrooms as indicated by the SEQ-C results. A one-way analysis of variance (ANOVA) was used to test the null hypothesis to determine if there was a significant relationship between the two variables. The analysis is presented in full in Table 4.9.

Table 4.9 Relationship between Social Self-Efficacy Score and Technological Approaches

Source		**Sum of Squares**	***df***	**Mean Square**	***F***	**Sig.**
Social	Between Groups	121.30	2	60.65	2.20	.112
	Within Groups	10456.34	380	27.52		
	Total	10577.64	382			

The dependent variable for the third sub question is the self-efficacy score concluded by the SEQ-C survey instrument, categorized as addressing emotional self-efficacy. Within the study, emotional self-efficacy scores for the technologically integrated approach had a mean of 26.06 with a standard deviation of 5.89; emotional self-efficacy scores for the technologically enhanced approach had a mean of 26.91 with a standard deviation of 5.90; and emotional self-efficacy scores for the technologically adverse approach had a mean of 26.62 with a standard deviation of 5.73. The ANOVA model for emotional self-efficacy is not significant at the .46 level with an *F* statistic of .78 and a *df* of 2. The full results for emotional self-efficacy are presented in Table 4.10.

Table 4.10 Relationship between Emotional Self-Efficacy Score and Technological Approaches

Source		**Sum of Squares**	***df***	**Mean Square**	***F***	**Sig.**
Emotional	Between Groups	53.10	2	26.55	.78	.461
	Within Groups	13016.63	380	34.25		
	Total	13069.73	382			

This data demonstrates that emotional self-efficacy scores from the SEQ-C do not have a significant relationship with the technological approach to integrating technology in the classroom. Since the ANOVA model for emotional self-efficacy is not significant at the .46 level, the null hypothesis cannot be rejected. Thus, we conclude that there is no relationship between emotional self-efficacy and approaches to integrating technology in the classroom.

Technological Competence Questionnaire (TCQ-C) Results

Students who participated in the study responded to six questions. The first 2 Likert-style questions were designed by the researcher to measure the amount of time students spend using technology in and out of school. The two questions in this section were presented with answers as a range from ‘less than 30 minutes’ to ‘4+ hours.’ Questions three and four were designed to measure a student’s self-perception of technological competence by asking them to rank their ability to use technology and their ability to teach technologies to others on a scale from one, being ‘not at all’ to five, being ‘completely confident.’ For a total score of technological competence, questions three and four were summed. Totaled scores for technological competence ranged from two to ten with 7.75 being the mean. Of the students who participated in the study, 224 students (58.5%) self-assessed their technological competence as high (>7), 147 students (38.4%) self-assessed their competence as midline, and 12 students (3.1%) self-assessed their competence as low (<5). Table 4.11 contains frequency information on the self-perception of technological competence for the 383 students that participated in the survey.

Table 4.11 Self-Perception of Technological Competence of Participants

Characteristic	Category	Frequency	Percent
Competence	2.00 – 4.00	12	3.1
	5.00 – 7.00	147	38.7
	8.00 – 10.00	224	58.5

RQ2

The second research question asked if there is a significant relationship between students' self-efficacy scores and their level of self-reported technological competence. Sub questions were created in order to address each type of self-efficacy as it related to divergent approaches to integrating technology. The first sub question asked if there is a significant relationship between mean academic self-efficacy scores and self-reported scores of technical competence. The null hypothesis for the first sub question stated that there will be no significant relationship between mean academic self-efficacy scores and self-reported scores of technological competence.

A Pearson (r) correlation was used to test the null hypotheses to determine if there was a significant relationship between student's self-reported technological competence and their level of academic, social, and emotional self-efficacy. A Pearson correlation, as described by Adams (2018) was chosen because it is used to determine if a positive linear relationship between the variables, a negative linear relationship between the variables, or no linear relationship between the variables can be seen.

The analysis of the variables concluded that there is a correlation between the students' technological competency scores and their level of academic (r = .141, p = .006, social (r = .253, *p* = .000), and emotional (*r* = .172, *p* = .001) self-efficacy, although statistically weak. The common variance between social self-efficacy and technological competency scores was the most significant (r2 = .064), suggesting that 6.4% of the variance in a student's social self-efficacy could be explained by the variance in a student's perceived technological competence. Likewise, 2% of a student's academic self-efficacy (r2 = .02) and 3% of a student's emotional self-efficacy (r2 = .03) could be explained by the student's perceived technological competence. Since the correlation was significant at .006 .000, and .001 respectively, the null hypothesis was rejected. Thus, we conclude that there is a relationship between self-reported technological competence and academic, social, or emotional self-efficacy.   The resulting statistics are presented in full in Table 4.12.

Table 4.12 Relationship between Self-Efficacy Scores and Technological Competence

Source	**Pearson r**	**Sig. (2-tailed)**	***N***
Academic	.141	.006	383
Social	.253	.000	383
Emotional	.172	.001	383

RQ3

The third research question asked if there is there a significant difference in self-reported time spent using technology between students in classrooms with divergent approaches to integrating technology. Sub questions were created in order to address where technology is being used, inside or outside of school. The first sub question asked if there is a significant difference in self-reported time spent inside school between students in classrooms with divergent approaches to technology. The null hypothesis for the first sub question stated that there will be no significant difference in self-reported time spent using technology inside school between learners in technology integrated, technology enhanced, and technology averse schools.

To address this question, self-reported technology usage inside school was separated and labeled into three groups; high (>3), low (<3), and midline (3). Then, a Chi-square test of independence was used to determine if a relationship existed between the categorical variables. As a result of the Chi-square test, the asymptotic significance (0.000) was less than the significance level (0.05); therefore, we rejected the null hypothesis. The test revealed that the proportion of students in technology-integrated classrooms who ranked high in technology usage inside school (.33) and students in technology-enhanced classrooms who ranked high in technology usage inside school (.34) was higher than students in technology-averse classrooms (.17). Similarly, the proportion of students who reported low usage in technology integrated classrooms (.29) and technology enhanced classrooms (.26) were also higher than the proportion of students in technology averse classrooms (.16). However, the proportion of students who reported midline usage in technology integrated classrooms (.37) and technology enhanced classrooms (.33) were lower than technology averse classrooms (.66). Since the null hypothesis was rejected, we concluded that there is a relationship between self-reported technology usage inside school and approach to integrating technology in the classroom. The resulting analysis is presented in full in Tables 4.13 and 4.14.

Table 4.13 Relationship between Technology Usage Inside School and Approach

Crosstab		**High**	**Low**	**Midline**	**Total**
Technology Integrated	Count	52	58	46	156
	Row Percentage	31.9%	37.2%	29.5%	156.0
	Proportion	.33	.34	.17	
Technology Enhanced	Count	54	44	34	132
	Row Percentage	41%	33.3%	25.8%	132.0
	Proportion	.29	.26	.16	
Technology Averse	Count	16	63	16	95
	Row Percentage	16.8%	66.3%	16.8%	132.0
	Proportion	.37	.33	.66	
Total	Count	122	165	96	383
	Row Percentage	31.9%	43.1%	25.1%	383.0

Table 4.14 Chi-Square for Self-Reported Technology Usage Inside School and Approach

Chi-Square	**Value**	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	30.108[a]	4	.000
Likelihood Ratio	30.113	4	.000
N of Valid Cases	383		

The second sub question asked if there is a significant difference in self-reported time spent outside of school between students in classrooms with divergent approaches to technology. The null hypothesis for this sub question stated that there will be no significant difference in self-reported time spent using technology outside of school between learners in technology integrated, technology enhanced, and technology averse classrooms.

To address this question, self-reported technology usage outside of school was separated and labeled into three groups; high (>3), low (<3), and midline (3). Then, a Chi-square test of independence was used to determine if a relationship existed between the categorical variables. As a result of the Chi-square test, the asymptotic significance (0.630) was much higher than the significance level (0.05); therefore, we failed to reject the null hypothesis. The test revealed that the proportion of students in technology-integrated classrooms who ranked high in technology usage outside school (.58), the proportion of students in technology-enhanced classrooms who ranked high in technology usage inside school (.60), and students in technology-averse classrooms (.65) were similar. Students who reported low usage in technology integrated classrooms (.18), technology enhanced classrooms (.19), and technology averse classrooms (.20) were also similar. The test continued to reveal that students who reported midline usage in technology integrated classrooms (.23), technology enhanced classrooms (.21), and technology averse classrooms (.15) followed the same pattern.

Since the study failed to reject the null hypothesis, we concluded that there is no relationship between self-reported technology usage outside of school and approach to integrating technology in the classroom. The resulting analysis is presented in full in Tables 4.15 and 4.16.

Table 4.15 Relationship between Technology Usage Outside of School and Approach

Crosstab		**High**	**Low**	**Midline**	**Total**
Technology Integrated	Count	92	28	36	156
	Expected Count	95.3	29.3	31.4	156
	Proportion	.58	.60	.65	
Technology Enhanced	Count	80	25	27	132
	Expected Count	80.6	24.8	26.5	132
	Proportion	.18	.19	.20	
Technology Averse	Count	62	19	14	95
	Expected Count	58	17.9	19.1	95
	Proportion	.23	.21	.15	
Total	Count	234	72	77	383
	Expected Count	234	72	77	383

Table 4.16 Relationship Between Technology Usage Outside of School and Approach

Chi-Square	**Value**	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	2.579[a]	4	0.63
Likelihood Ratio	2.683	4	0.612
N of Valid Cases	383		

RQ4

The fourth research question asked if there is there a significant relationship between self-reported times spent using technology and self-reported technological competence. Sub questions were created in order to address where technology is being used, inside or outside of school. The first sub question asked if there is a significant relationship between self-reported times spent inside school and self-reported technological competence. The null hypothesis for the first sub question stated that there will be no significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school.

To address this question, a Pearson (r) correlation was used to test the null hypotheses to determine if there was a significant relationship between self-reported times spent using technology inside school and self-reported technological competence. The analysis of the variables concluded that there appears to be a strong, positive correlation between the variables (r = .749). The common variance between the two variables (r^2 = .561) suggests that 56% of a student's technological competence could be explained by the student's technology usage inside the classroom. Based on the Pearson correlation coefficient value of 0.749, the null hypothesis must be rejected. Thus, we conclude that there is a relationship between self-reported times spent using technology inside school and self-reported technological competence. The resulting analysis is presented in full in Table 4.17.

Table 4.17 Relationship Between Technology Usage Inside School and Technological Competence

Source	Pearson (r)	Sig. (2-tailed)	N
Technology Usage	.749	.000	383

The second sub question asked if there is a significant relationship between self-reported times spent outside of school and self-reported technological competence. The null hypothesis for the second sub question stated that there will be no significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside of school.

To address this question, a Pearson (r) correlation was used to test the null hypotheses to determine if there was a significant relationship between self-reported times spent using technology outside of school and self-reported technological competence. The analysis of the variables concluded that there appears to be a strong, positive correlation between the variables ($r = .760$). The common variance between the two variables ($r^2 = .577$) suggests that 58% of a student's technological competence could be explained by the student's technology usage outside the classroom. Based on the Pearson correlation coefficient value of 0.760, the null hypothesis must be rejected. Thus, we conclude that there is a relationship between self-reported times spent using technology outside of school and self-reported technological competence. The resulting analysis is presented in full in Table 4.18.

Table 4.18 Relationship Between Technology Usage Inside School and Technological Competence

Source	Pearson (r)	Sig. (2-tailed)	N
Technology Usage	.760	.000	383

The analysis of the data for RQ4 suggests that there is a significant relationship between self-reported times spent using technology and self-reported technological competence, regardless if that technology was used inside or outside of school. These results parallel the findings of Bar and DeSouza (2016), inferring that the more time spent doing a particular task, the greater one's perceived ability with that task.

CHAPTER V

INTERPRETATIONS, CONCLUSION, AND RECOMMENDATIONS

Most students in developed countries use technology at some point during a regular day, whether it is through their use of the Internet, gaming platforms, mobile phones, tablets, or computers (Cravey, 2008; Hertzler, 2010). Students bringing their own technology into schools has also become increasingly commonplace due to the expanding availability and affordability of technology today (Gray et al., 2010). It is technology's familiarity among students that lends credibility to the idea that technology in the classroom can raise the appeal of learning in some students, or even close achievement gaps all together (Alsafran & Brown, 2012; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). In the last decade, the integration of instructional technologies in the classroom has become an important topic for educators (McDowell, 2013). In an effort to keep up with the growing trend of technology in learning, some schools have rushed to integrate technology anywhere and in any way possible (Staples et al., 2005), while others have chosen to exclude it all together.

With such a divide in technological approaches, educators and administrators are often left wondering how to proceed (Calisir et al., 2014; King, 2002; Oppenheimer, 2003; Perrotta, 2013; Young, 2004). Although there are many studies measuring the effectiveness of technology currently in the classroom, there is a lack of literature addressing what technologies are the most effective and how they should be used in schools to achieve the best results. This gap highlighted the need to study the impact that technology integration has on learners (Calisir et al., 2014;

King, 2002; Oppenheimer, 2003; Perrotta, 2013; Young, 2004) and, as our society advances in technology, the need to have a consistent understanding of how to use technology effectively inside the classroom (Moran et al., 2008).

The purpose of this study was to examine the affect divergent approaches to integrating technology may have on academic, social, and emotional self-efficacy. By examining the relationship between a learner's self-efficacy and their classroom's approach to integrating technology, this study aimed to provide further insight on how schools should address this issue. This study approached the problem by separating classrooms based on their approach to integrating technology and administering a specialized measure of self-efficacy, developed by Peter Muris (2001), and a measurement of technological competence, developed by the researcher. Through these instruments, the study aimed to uncover if a relationship exists between how classrooms approach the integration of technology and how students view their own academic, social, and emotional self-efficacy. The researcher analyzed the data gathered to address the following research questions:

1. Is there a significant difference in self-efficacy between students in classrooms with divergent approaches to technology?
    a. Is there a significant difference in mean academic self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?
    b. Is there a significant difference in mean social self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?

    c. Is there a significant difference in mean emotional self-efficacy scores between learners in technology enhanced, technology integrated, and technology averse classrooms?

2. Is there a significant relationship between students' self-efficacy scores and their level of self-reported technological competence?
    a. Is there a significant relationship between students' mean academic self-efficacy scores and their level of self-reported technological competence?
    b. Is there a significant relationship between students' mean social self-efficacy scores and their level of self-reported technological competence?
    c. Is there a significant relationship between students' mean emotional self-efficacy scores and their level of self-reported technological competence?
3. Is there a significant difference in self-reported time spent using technology between students in classrooms with divergent approaches to technology?
    a. Is there a significant difference in self-reported time spent using technology inside school between learners in technology enhanced, technology integrated, and technology averse classrooms?
    b. Is there a significant difference in self-reported time spent using technology outside of school between learners in technology enhanced, technology integrated, and technology averse classrooms?
4. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology?

a. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology inside school?

b. Is there a significant relationship between students' level of self-reported technological competence and their self-reported time spent using technology outside school?

Summary of Findings

The 383 students who participated in the survey encompassed a wide range of demographic characteristics, such as gender, grade, and perceived technical experience. SPSS was used to analyze the data collected for each research question in this study. The research questions and hypotheses were addressed using multiple methods. A one-way analysis of variance test was used for RQ1, a Pearson correlation for research questions two and four, and a Chi-square test of independence for RQ3. The previous chapter gives a detailed analysis of the research questions and hypotheses. The key findings of the analysis are also summarized below.

RQ1 asked if there was significant difference in self-efficacy between students in classrooms with each of three divergent approaches to technology; technology integrated, technology enhanced, and technology averse classrooms. As demonstrated by the research of Adams (2018), an ANOVA was used to test the null hypotheses of each of the sub questions in an effort to determine if there is a relationship between self-efficacy and each of three divergent approaches. This test was chosen because it is used to determine whether there are any statistically significant differences between the means of two or more independent and unrelated groups, in this case the category of technology integration (Adams, 2018). The results from the analyses (α =.05) indicated that technology integrated classrooms do have a positive effect on a learner's academic self-efficacy (α =.001). However, there was no significance between the technology integrated approach and the remaining types of self-efficacy. The analysis also showed no significance between the approaches of integrating technology and either social self-efficacy (α =.112) or emotional self-efficacy (α =.461). The results showed that a relationship exists between classrooms that integrate technology to the level of being categorized as technology integrated and have a learner's academic self-efficacy.

RQ2 asked if there was a significant relationship between students' self-efficacy scores and their level of self-reported technological competence. A Pearson correlation was used to test $H_0 4$, $H_0 5$, and $H_0 6$. Based on the data, the researcher rejected each of the null hypotheses, indicating that self-efficacy scores do have a weak, but significant, relationship to perceived technical competence amongst the participants.

RQ3 asked if there is there a significant difference in self-reported time spent using technology between students in classrooms with divergent approaches to integrating technology. This research question was separated into two sub questions focusing on time spent inside school and outside of school respectively. To test $H_0 7$ and $H_0 8$ self-reported technology usage was separated and labeled into three groups; high (>3), low (<3), and midline (3). Then, a Chi-square test of independence was used to determine if a relationship existed between the categorical variables. The research data for $H_0 7$ rejected the null hypotheses indicating that there is a relationship between self-reported technology usage inside school and approach to integrating technology in the classroom. However, the research data for $H_0 8$ failed to reject the null hypothesis concluding that a relationship between times spent using technology between students in classrooms with divergent approaches to integrating technology does not extend to students using technology outside of the classroom.

RQ4 asked if there is there a significant relationship between self-reported times spent using technology and self-reported technological competence. This research question was separated into two sub questions focusing on time spent inside school and outside of school respectively. To test $H_0$9 and $H_0$10 self-reported technology usage was separated and labeled into three groups; high (>3), low (<3), and midline (3). Then, a Pearson correlation was used to determine if a relationship existed between the variables. The research data for $H_0$9 and $H_0$10 rejected the null hypotheses indicating that there is a correlation between self-reported times spent using technology and self-reported technological competence.

Discussion and Implication of Findings

A review of the literature found that the relationship between technology and education is of great concern to researchers, schools, parents, and students (Brusca, 1991; Cassil, 2005; Cuban & Cuban, 2009; Kulik, 2003; Li & Ma, 2010; Strong et al., 2011; Torgerson et al., 2004; Waxman et al., 2002). Further, one focus of education should be technology; the development of instructional technologies and their use is continuing to grow at a rapid pace (Bitter & Pierson, 2001; Branch, 2015; Calisir et al., 2014; Collins & Halverson, 2009; Kirkwood & Price, 2014; Mao, 2014). Despite an emphasis of technology, specifically its effect on achievement, there is a lack of research on the effect integrating technology might have on other factors that impact learners. Of these factors, this study focuses on academic, emotional, and social self-efficacy, as research has found those factors to correlate strongly with academic achievement and overall satisfaction in schools (Bandura, 1997; Reynolds, 1988).

RQ1 attempted to determine if a relationship, if any, exits among classrooms with divergent approaches to integrating technology in the classroom and the aforementioned types of self-efficacy. Based on the findings of this study, a significant relationship was found between technology integrated classrooms and the learners' academic self-efficacy ($H_0$1). This findings in this study support assertions made by Wenglinsky (2005) in *the Journal of Educational Leadership*. After analyzing studies going back to the 1990s performed by the National Assessment of Educational Progress, Wenglinsky (2005) asserts that the relationship between technology and student achievement is dependent on several factors; most notably, the way technology is integrated. In his article, Wenglinsky (2005) concludes that achievement seems to rise if, instead of integrating technology as a directive for projects, learners are allowed to use technology-based tools to address some of their learning tasks in their own way, an approach this study defines as technology integrated. Due to the well documented correlation in the literature between academic self-efficacy and academic achievement (Bandura, 1997; Reynolds, 1988), this study supports Wendlinsky's (2005) assertion by suggesting that the relationship between technology integrated classrooms and academic self-efficacy may be one reason for an increased achievement. This is additionally supported in a study by Joo and Choi (2000), concluding that self-regulated learning, an aspect of technology integrated classrooms, is positively related to academic self-efficacy, strategy use, and internet self-efficacy.

RQ2 attempted to determine if a relationship, if any exists between self-efficacy and a perceived level of technological competence. Although the study found a significant relationship between the variables, the relationship between the variables turned out to be weak. This finding mirrors current literature linking self-efficacy and technological competence, which is mixed (Joo et al., 2000; Slovák, 2015; Warschauer, 2004). A study of academic self-efficacy by Joo and

Choi (2000) concluded that scores on a standardized test can be positively predicted by measuring Internet self-efficacy, suggesting a relationship exists between performance and perceived technological competence. However, Joo and Choi (2000) found no significant relationship between academic self-efficacy and internet self-competency. A study by Lim (2001) focusing on computer self-efficacy and academic self-concept suggested that no significant relationship existed between academic self-efficacy and technological competence. Studies in social and emotional skills by Petr Slovak (2015) and Mark Warshauer (2004) concluded that technological competence may influence better social and emotional skills, as students use technology to form meaningful relationships. However, there is lack of literature suggesting that social and emotional self-efficacy itself is influenced by technological competence.

RQ3 attempts to determine if a relationship, if any exists between time spent using technology inside or outside of the classroom and the approach that classroom used to integrate technology in learning. As expected, this study found a significant relationship between self-reported technology usage inside school and approach to integrating technology in the classroom, suggesting that an increase in technology in the classroom would lead to an increase in student usage. However, there was no significant relationship between technology usage outside of the classroom and the approach that classroom used to integrate technology.

RQ4 aimed at exploring a potential relationship between time spent using technology inside and outside of school with perceived technological competence. An analysis of the data concluded that a strongly significant relationship was found between time spent using technology inside or outside of school and perceived technological competence. This suggests that a learner's technological competence is significantly influenced by the time spent using technology, regardless of where it is used.

The significance of the findings in RQ1 suggest that academic self-efficacy in students can be positively impacted by classrooms deciding to integrate technology using a self-regulated learning approach. Inversely, the study concludes that a classroom's approach to integrating technology will not impact a student's social or emotional self-efficacy positively or negatively. In addition, the findings in RQ2, RQ3 and RQ4 suggest that (RQ3) the more technology is integrated in the classroom, the more a student uses that technology, (2) the more a student uses technology, the higher the student's technological competence, and (3) a student's technological competence has some positive affect on the student's academic, social, and emotional self-efficacy.

Recommendations

Recommendations for Future Research

As discussed in the literature, technology in schools is growing at a rapid pace and has become a preeminent strategy in some schools as a way to increase student achievement, engagement, and learner performance (Bitter & Pierson, 2001; Branch, 2015; Calisir et al., 2014; Collins & Halverson, 2009; Kirkwood & Price, 2014; Mao, 2014). However, the literature also highlights inherent risks in using instructional technologies including an impact on budget, student focus, distraction, and a lower quality of instruction (Clark, 1983; Kozma, 1994). Due to the lack of consistent understanding of the effects of technology on learners, it is important to analyze the effectiveness integration of technology has on factors that impact student learning, most notably self-efficacy. This study provides insight on self-efficacy, as it relates to the integration of technology into the classroom. However, additional research can continue to provide insight on the relationship between technology integration and other variables. More research could also explore the influence of teacher and peer roles to how technology is viewed and used. The following are recommendations by the researcher for future research and practice.

To test this study's findings, the researcher suggests a follow up study be conducted using a larger population of schools, learners, and a more diverse geographic location. Expanding the diversity within the study population would increase the validity of the study by making the results more generalizable across middle schools nationwide. In addition, future research should be conducted to broaden student groups into higher education and secondary school platforms, potentially providing different results. As secondary schools and higher education institutions are more likely to utilize technology for learning online (Nagel, 2010), the results of such a study would have a greater impact on current e-learning trends. Also, studying these populations would add credibility to the findings in this study and encourage discussions around the instructional design of learning content using technology.

Future research should include breaking down technological approaches into specific tools or individual competencies to add detail to specific correlations in the classroom. A more granular study into specific technologies and behaviors would further clarify the significance between technology integrated classrooms and academic self-efficacy, leading to specific tools classrooms should use over others. In addition, future instruments should broaden the scope of questions to analyze computer self-efficacy, mobile self-efficacy, and the development of technology training and teacher experience. More specifically, a study exploring the relationship between device type and self-efficacy would clarify whether technology enhanced classrooms that utilize mobile devices have a different impact on self-efficacy than those using a freestanding computer lab. Further, a teacher's expertise in a specific device or technology may play a role in how well the technology is integrated. For this reason, the researcher suggests a study be conducted to measure the amount of technology training each classroom teacher has completed and its effect on the approach of technology integration.

Future research should also include multiple instrument administrations to study the correlation between technology integration and self-efficacy over time. As self-efficacy changes based on environmental factors (Bandura, 1986; Jackson, 2002), the amount of time technology is used throughout the school year and the specific time of year a survey is administered, might be factors that could reveal different results. Additionally, by studying how often and when instructional technology is used, regardless of the approach utilized, patterns of utilizing technology might emerge.

Along with the above quantitative recommendations, future research should include a qualitative study of learner observations and interviews, which may uncover additional variables that impact self-efficacy and technology in the classroom. A secondary qualitative study would gain a better understanding of motivations and opinions around the technology being integrated. It would also uncover underlying reasons for an individual learner's lack or abundance of self-efficacy.

Recommendations for Practice

Based on the findings in this study, the researcher recommends that school teachers, school administrators, and districts alike open a discussion on the strategy of integrating technology in the classroom. Such a discussion should include an overall framework for how classrooms can provide and implement technology in a way that emphasizes technology integrated, self-regulated learning in their content area. To do so, educators and administrators will have to embrace that the way technology is integrated in each classroom might be affecting student's academic self-efficacy. As this study found that there was a significant relationship with academic self-efficacy and technology integrated classrooms, schools should not only encourage, but also provide the technology for teachers to use in the classroom. In addition, schools should provide training and motivation for teachers to use technology as an integrated strategy in their curricula. Further, schools that are currently enhancing the current curricula with technology tools should utilize a more integrated and self-regulated approach to how they use the technology they have.

Summary

The diffusion of technology into education has long been a topic of debate (Clark, 1983; Kozma, 1994). A lack of conclusive research and a consistent emergence of new technologies have some researchers asserting that technology has a positive impact on learning in the classroom, while others assert that it does more harm than good (Clark, 1983; Kozma, 1994). However, the use of technology in the classroom has continued to grow exponentially over the last 30 years (Bitter & Pierson, 2001; Branch, 2015; Calisir et al., 2014; Collins & Halverson, 2009; Kirkwood & Price, 2014; Mao, 2014). As our society advances in technology, it is important that our educational systems have a consistent understanding of how to use technology effectively inside the classroom (Moran et al., 2008). The purpose of this study was to explore the effect divergent approaches to integrating technology into learning may have on academic, social, and emotional self-efficacy. Specifically addressed in this study were variables that could potentially impact self-efficacy, including gender, year in school, perceived technological competence, and time spent using technology.

The population of this study included teachers and students in several middle schools in southeast Tennessee. All 39 core-subject teachers in the selected schools were invited to participate, of which 34 teachers completed the survey. Of the sample of classrooms, 13 were categorized as technology integrated (38.3%), 19 were categorized as technology enhanced (55.2%), and 2 were categorized as technology averse (5.9%). A population of 2,426 middle school students from the selected middle schools were invited to participate, of which 383 students completed the survey; 222 female students (58%) and 161 male students (42%).

Data from the participant were analyzed using SPSS. A one-way ANOVA was used to test hypothesis one, a Pearson correlation was used to test the hypotheses two and four, and a Chi-square was used to test hypothesis three. The analysis discovered a relationship between classrooms with a technology integrated approach and academic self-efficacy. The data also found a relationship between classrooms that integrated technology in the classroom and time spent using technology inside school. Inversely, the analysis revealed no statistically significant relationship between any of the remaining variables.

Although the findings of this study were limited due to the sample size, geography, and classroom content areas, the findings suggest several recommendations for practice by teachers, principals, and school districts alike. School teachers, administrators, and district leaders should open a discussion on the strategy of integrating technology in the classroom. School districts should drive the conversation by creating an open forum and rewarding schools for sharing information and collaborating on technological resources. In addition, schools should implement a consistent framework for integrating technology in their classrooms, emphasizing technology-based, self-regulated learning. Schools should not only encourage, but also provide the budget, technology, and training to motivate teachers to use technology as a strategy for increasing academic self-efficacy.

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APPENDIX A

INSTITUTIONAL TECHNOLOGY INTEGRATION SURVEY (ITIS)

The following questions were asked, along with observation, to determine which category best fits the school's collective approach to integrating technology in learning:

1. Do you utilize technology in your school? Why or Why Not?
2. What technologies do you use?
3. How are they used?
4. How often are they used?
5. How is the use of those technologies moderated?

APPENDIX B

PARENT AUTHORIZATION FORM

Instructions

Thank you for taking the time to participate in my doctoral study. In an effort to make it as easy as possible, I have included everything you need in this packet, as well as outline exactly what to do below.

Step 1.

Please send home a "Parent Authorization" form with each child. These forms will need to be returned and placed back in this envelop with the completed surveys. I have included in this packet the exact copy you need +1. These forms may be copied and redistributed as needed.

Step 2.

When you can, take the time to answer the 7 questions on your "Teacher Classroom Technology Questionnaire." At the top of this questionnaire, it will display your name, class size and "Form B."

Step 3.

On the day you administer the survey, please hand each student a questionnaire and ask them to put their name, signature, and Survey ID on the "Student Authorization" form. Their Survey ID can be found at the top of their survey paper, along with the word "Form A."

Step 4.

When all surveys have been completed, please place all papers (Authorization Forms, Form A, and Form B) back in the envelope and return to the main office.

Parent/Guardian Authorization

Hello! My name is Ross Ian Vance and I am a doctoral candidate at the University of Tennessee at Chattanooga. I want to invite your child to take an anonymous survey as a part of a research study I am conducting. This study is designed to explore the relationship between how schools integrate technology and how students develop self-efficacy during a student's developing years. This study has the potential to impact how schools choose to integrate technology and how we understand the development of self-efficacy in a digital world. Your child was selected as a possible participant in this study because he attends a participating middle school in the district. If you decide to allow your child to participate, he or she will be given a 30 question, multiple-choice survey in their homeroom. It will take approximately 10-15 minutes to complete.

Sincerely,
Ross Ian Vance

The survey is designed to assess their level of self-efficacy in several areas. If you decide NOT to allow your child to your child to participate, he or she will be given an alternate activity in the room while the assessment is taken. Your child's participation is voluntary. Your decision whether or not to allow our child to participate will not affect your or your child's relationship with the school, the researcher, or any other party. Any information that is obtained in connection with this study will remain confidential and cannot be tied to any individual child. The information collected will be disclosed only with your permission or as required by law. Subject identities will be kept confidential by not collecting personally identifiable information and coding the results by unique number only. I appreciate your consideration.

Your signature indicates that you have read and understand the information provided above, that you willingly agree to allow your child to participate, that you and/or your child may withdraw your consent at any time and discontinue participation without penalty, and that you are not waiving any legal rights or claims by signing this form.

I give consent for my child to participate in the short survey	
Child's Name (print)	
Parent's Name (print)	
Parent's Signature	
Date	

If you have any questions about the study, please feel free to contact Ross Ian Vance at technologyresearchstudy@gmail.com. If you have any questions about your rights as a subject/participant in this research, or if you feel you or your child have been placed at risk, you can contact Dr. Amy Doolittle, the Chair of the Human Subjects Committee, Institutional Review Board at 423-425- 5563. Additional contact information is available at www.utc.edu/irb.

APPENDIX C

STUDENT AUTHORIZATION FORM AND PARTICIPANT ROSTER

Student Authorization

I have been informed that my parent(s) have given permission for me to participate, if I want to, in a study about technology in the classroom. My participation in this project is voluntary and I have been told that I may stop my participation in this study at any time. If I choose not to participate, I can sit in the room until the survey is finished and it will not affect my grade in any way.

Child Name (Please PRINT)	Child Signature	Survey ID*

* This ID can be found at the top of each individual student's survey.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact Dr. Amy Doolittle, the Chair of the Human Subjects Committee, Institutional Review Board at 423-425-5563. Additional contact information is available at www.utc.edu/irb.

APPENDIX D

COMBINED SEQ-C AND TCQ-C SURVEY

Technology and Self-Efficacy Questionnaire

Instructions: Please check the box that best corresponds to your answer for each question below. You may only check one (1) box per question.

Question	1	2	3	4	5
	Very Poor	Below Average	Average	Above Average	Excellent
How well can you get teachers to help you when you get stuck on schoolwork?					
How well can you express your opinions when other classmates disagree with you?					
How well do you succeed in cheering yourself up when an unpleasant event has happened?					
How well can you study when there are other interesting things to do?					
How well do you succeed in becoming calm again when you are very scared?					
How well can you become friends with other children?					
How well can you study a chapter for a test?					
How well can you have a chat with an unfamiliar person?					
How well can you prevent to become nervous?					
How well do you succeed in finishing all your homework every day?					
How well can you work in harmony with your classmates?					
How well can you control your feelings?					
How well can you pay attention during every class?					
How well can you tell other children that they are doing something that you don't like?					
How well can you give yourself a pep-talk when you feel low?					
How well do you succeed in understanding all subjects in school?					

	Very Poor	Below Average	Average	Above Average	Excellent
How well can you tell a funny event to a group of children?					
How well can you tell a friend that you don't feel well?					
How well do you succeed in satisfying your parents with your schoolwork?					
How well do you succeed in staying friends with other children?					
How well do you succeed in suppressing unpleasant thoughts?					
How well do you succeed in passing a test?					
How well do you succeed in preventing quarrels with other children?					
How well do you succeed in not worrying about things that might happen?					
	Very Poor	Below Average	Average	Above Average	Excellent
How comfortable are you with using technology?					
How comfortable are you with teaching technology to others?					
	< 30 min	30 – 60 min	1 – 2 hours	2 – 4 hours	4 + hours
How much time do you spend using technology while IN school?					
	< 30 min	30 – 60 min	1 – 2 hours	2 – 4 hours	4 + hours
How much time do you spend using technology while OUT of school?					
	6	7	8		
What grade are you in?					
	Male	Female	Other		
What is your gender?					

Please review to make sure each question has only one (1) check and return completed survey to your teacher. Thank you for taking the Technology and Self-Efficacy Questionnaire.

APPENDIX E

VARIABLE ANALYS

	Variable Label	Levels of the Variable	Measurement Instrument	Data Type
Dependent Variable(s)	Academic Self-Efficacy of Learning	Likert Scale	Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. Journal of Psychopathology and Behavioral Assessment, 23, 145-149.	Interval
	Social Self-Efficacy of Learning	Likert Scale	(as defined by the Self-Efficacy Questionnaire for Children developed by Murris, 2001) Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. Personality and Individual Differences, 32, 337-348	Interval
	Emotional Self-Efficacy of Learning	Likert Scale	(as defined by the Self-Efficacy Questionnaire for Children developed by Murris, 2001) Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. Personality and Individual Differences, 32, 337-348	Interval

Independent Variables	Classrooms Approach to Technology Integration in Learning	1=Technology Integrated 2=Technology Enhanced 3=Technology Averse	Developed by the Researcher	Nominal
	Self-Reported Perception of Technological Competence	Likert	Developed by the Researcher	Interval
Some Extraneous Variables	Gender	1 = Female 2 = Male		Nominal
	Grade	1 = 6th 2 = 7th 3 = 8th 4 = 9th		Nominal
	Ethnicity	1 = African American 2 = East Asian 3 = Caucasian 4 = Hispanic 5 = Native American 6 = South Asian/Indian 7 = Middle Eastern		Nominal

VITA

Ross Ian Vance was raised in Leeds, England before morning to the U.S. at a young age. He graduated in 2001 from Northside High School in Roanoke, Virginia and began attending Lee University, initially pursuing a career in Music Performance. By the time he graduated with a Bachelor of Arts in Music in 2004 and a Bachelor of Music in Education in 2005, he had discovered his passion for teaching and began his career as an educator. Ross taught for outdoor education centers in Tennessee and Virginia, managed corporate training teams for various organizations, and started a company designing online learning and development programs. He additionally graduated with a Masters of Curriculum and Instruction in 2008 from Lee University. During that time, Ross also began teaching for the Helen Devos College of Education, developing a Wilderness Emergency Medicine program and certifying Wilderness First Responders and EMTs. He began his studies in the UTC Learning and Leadership Doctorate of Education program in 2011 with a desire to study the relationship that both technology and the outdoors can pay in the development of young minds. He will complete the requirements of the Doctorate of Education degree in 2019.