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TEACHERS' PERCEPTIONS OF TECHNOLOGY EFFECTIVENESS IN HIGH SCHOOL

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ABSTRACT

The purpose of this study was to examine high school teachers' perceptions of technology in the classroom, including technology access, usage, and effectiveness. This study was conducted by administering a survey to high school teachers, Grades 9 through 12, in Indiana. The survey, entitled Teachers' Perceptions of Technology Effectiveness in High Schools was used with high school teachers' to determine their perceptions of technology access, usage, and effectiveness in classrooms. A total of 343 teachers submitted complete responses to the Teachers' Perceptions of Technology Effectiveness in High Schools. I developed a survey to quantitatively measure the perceptions of teachers on current technology usage patterns in the state of Indiana. Data were analyzed using a Pearson correlation test, a one-way ANOVA test, and a multiple regression test. The data analysis showed a significant correlation between teacher software and equipment utilization with perceived effectiveness. Also, significant differences were noted in teachers' perceptions and usage of technology based on age. Last, significant differences were found in perceptions and usage of technology based on teaching position. Based on the above results the following conclusion was proposed: An effective professional development or training program should be implemented for teachers when implementing technology. School corporations need to offer a comprehensive program over a period of time in order for teachers to acclimate themselves to various capabilities of said technology. Within this comprehensive program, there would also be time for on-going professional development, time to collaborate

with peers, administrative support, reflection and goal setting, and even additional summer opportunities for further learning.

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CHAPTER 1

INTRODUCTION TO THE STUDY

The revolution technology brings into schools extends beyond how to use computers, how to use multimedia, or even how to use the Internet (Collins & Halverson, 2009). The revolution focuses on an educator's common mantra of the five w's and h: where, when, why, what, who, and how. Technology is responsible for restructuring "how, where, when, with whom, and even why people work" (November Learning, 2012, para. 1). Not only are businesses undergoing transformations, so too, are American schools. American schools are attempting to keep pace with the ever-evolving world. The integration of innovative types of technology, such as a one-to-one device, a tablet, or even a Chrome book, within a school's curriculum is one example of how education is contending in the global arena (Google, n.d.). Due to constant pressure policy makers, educators, and stakeholders feel in making strides to become global leaders in educational policy and reform, technology has become an avenue to achieve success.

Along with the changes in technology, vicissitudes have occurred in how students learn. Some like to refer to these new learners as digital natives, or the Net Generation, but regardless of the label given, educators have to find new ways to speak the language of the 21st century students (Prensky, 2001; Rosen, 2011; Tapscott, 1999). According to Rosen (2011), the terms Net Generation and iGeneration refer to teens who use various technologies. The iGeneration can be identified as individuals who were born in the 1990s and after. Rosen (2011) stated, "The i represents both the types of digital technologies popular with children and adolescents (iPhone, iPod, Wii, iTunes, and so on)" (p. 10). Essentially, these children and/or adolescents have been defined by their technology, electronic communication, and media usage (Rosen, 2011). The Nielsen Company tracked the number of texts received and sent for a typical teenager, which is around 3,339 texts per month (Nielsen Wire, 2010). Rosen (2011) stated, "To members of the iGeneration, a phone is not a phone. It is a portable computer that they [children and adolescents] use to tweet, surf the web, and, of course, text" (pp. 12-13).

Educators have to speak-the-talk in order to communicate with students and can do so by implementing and instructing with technology (TeachThought, 2013). Technology allows for greater accessibility to teachers, eliminating antiquated methods of communication and allowing students the ability to "send a text, email or social message . . . at any time" (TeachThought, 2013, para. 10). Teaching with technology allows teachers "to convey content more powerfully and efficiently" (Rosen, 2011, p. 13). Using technology in the classroom provides the chance for educators to teach 21st century skills (e.g. shared decision-making, information sharing, collaboration, innovation, and speed) needed to compete in the global market, as well as promoting increased engagement in classroom lessons (Pacific Policy Research Center, 2010). According to Rosen (2011), "It doesn't mean providing technology in the classroom for technology's sake" (p. 13). More opportunities for the independent and self-paced learner are available with technology usage (Bacon, 2013). A changing curriculum and instruction promotes "a transition from a teacher-centric culture to a learner-centered instruction" (Huffington Post, 2012, para. 6). Teachers are changing instruction and techniques within classrooms in order to advance with students. The report from the Alliance for Excellent

Education suggests inserting an "effective educational plan that will connect and improve" teaching, technology and use of time for "whole-school reform and productive instruction" (as cited in Huffington Post, 2012, para. 10). The focus of technology in the classroom should allow for teachers to teach specific content and "to use technology to convey content more powerfully and efficiently" (Rosen, 2011, p. 13).

William Bridges was quoted in *Fortune* magazine as saying, "The modern world is on the verge of another leap in creativity and productivity" (as cited in November Learning, 2012, para. 2), but this leap can be related to the field of education. This leap in education involves the ability to communicate with the learners of the 21st century much like businesses selling their services to different customers, educators have to find ways to engage students (November Learning, 2012). Technology has been infused in classrooms partially due to convenience, cheaper costs, and size (Clarke & Svanaes, 2012). More significantly, technology of the 21st century offers variations in lesson creation and instruction, as well in how material is presented (Vrtis, 2010). Teachers have the ability to access a copious amount of curriculum as well as content online in varying formats, including video and audio elements that can engage students (Rosen, 2011).

This study looked at high school teachers' perceptions of technology access, usage, and effectiveness. Evidence supports that technology ownership, one-to-one devices, and the like is on the rise, especially among high school seniors and college students (Pearson Foundation, 2012). Technology within schools is also on the increase. "Some 2,000 schools have already partnered with Google to use its lightweight Chromebooks" (Elliot, 2013, para. 6). More and more schools are seemingly turning to some form of increased technology in facilities (Pearson Foundation, 2012). According to Google, as many as 20 million students and schools have already implemented use of the Chromebook in schools (Elliot, 2013). During 2012 fall semester, "86% of students brought laptops, 62% smartphones, 15% tablets, and 12% e-readers" (Caverly, 2012, p. 32). In Dalstrom's (2012) study, most students are using laptops or desktops for academic purposes and "two-thirds reported also using smart phones and tablets and half reported using e-books academically" (Caverly, 2012, p. 32). Due to increases in the availability of technology, whether in schools or out of schools, educators needs to be able understand the type of access available and the type of technology students are accessing in order to move beyond "the constraints of brick and mortar classrooms to expand learning environments" (Caverly, 2012, p. 33).

Students of the 21st century fall under the description of digital natives and use some form of technology while in school and out of school; therefore, students want and expect to take on an active-learner role while in school (Caverly, 2012; Education Reform Studies, 2013; Huffington Post, 2012; Prensky, 2001). Technology in the classroom will allow students to use a tool to communicate with others, research, read, write, and most notably, take control of their learning (Education Reform Studies, 2013). Students want to "generate, obtain, manipulate, or display information" and technology is one medium that conveniently allows students to perform the latter tasks (Education Reform Studies, 2013, para. 1). Technology will be a venue where teachers can connect with students and create a non-tradition teaching environment that is both engaging and educational (National Education Association, 2008). Technology that is used with a purpose to be productive in class will allow students and teachers to spend time analyzing, synthesizing, and assimilating material (Johnson, Smith, Levine, & Haywood, 2010; Rosen, 2011). In a spectrum, teachers on the left, technology in the middle, and students on the right, technology is an educational tool that seemingly helps close the gap between the need to control learning and to continue motivation for learning. If technology is used correctly, the barrier of a traditional structured classroom is removed (Britland, 2013). If the teacher does not know how to use technology, it will not make much of a difference in learning (Elliot, 2013; Rosen, 2011).

Students receive lessons from teachers and translate those lessons. Technology in the classroom is a tool students use to communicate with others, research, read, write, and most notably, take control of their learning (Education Reform Studies, 2013). Students want to "generate, obtain, manipulate, or display information" (Education Reform Studies, 2013, para. 1) and technology is one medium that conveniently allows students to perform the latter tasks. When students finish the lesson or assignment, it is transferred back to the teacher for review. Technology becomes a venue where teachers can connect with students and create a non-tradition teaching environment that is both engaging and educational. It is not always the content that matters, but rather the format used to deliver content (Rock, 2012). Again, the where, when, why, what, who, and how matters when it comes teaching and learning with technology (November Learning, 2012).

Introducing or even increasing computers in schools requires changes to curriculum, teaching practices, resources, and even rearranging the organizational structure of schools (Collins, 1996; Hawkins & Sheingold, 1986). Even though vast transformations have taken place in society regarding technology, educational settings have been slow to make necessary changes partially due to the latter reasons. An important element influencing technology usage within classrooms is professional development training and/or technical support. Teachers who have limited training or in-service opportunities with technology use and/or implementation tend to have more anxiety when using technology (Rosen & Weil, 1995). For technology to be a successful tool in student learning, teachers need to have adequate training and/or support in order for usage of technology to go beyond teaching of subject matter. Scheffler and Logan (1999) underscored the idea that technology involves the ability to have basic computer skills as well as the ability to have purposeful tasks such as researching, analyzing information or data, applying knowledge, communicating and collaborating. Teachers using technology in the classroom will need to promote higher level thinking activities. According to a 2013 Pew Research Center Internet and American Life Project study of teachers and technology, "54% of teachers in low-poverty schools reported receiving 1-8 hours of edtech professional development and 35% of teachers reported receiving 9 or more hours" and 12% reported receiving no education technology professional development (Reich, 2013, para. 5). Pew's study highlights an important determinant. Limited professional development for teachers on how to implement and use technology is a variable that could affect usage of technology in classrooms.

On a similar note, access to and type of technology plays a role in how or whether teachers implement technology (Rocheleau, 1995). In schools with elevated access to computer technology, Cuban, Kirkpatrick, and Peck (2001) learned that 30% (4 out of 13) teachers altered teaching instruction to match technology availability. As well, technology failures can become roadblocks to teacher implementation of technology (Becker, 1994; Sutton, 1991). According to the National Education Association's policy brief, "A national count of computers in public schools shows a ratio of 3.8-to-1 for the number of students sharing an 'instructional computer' with Internet access" (National Education Association, 2008, p. 1). The data provided does not make any division between computers used in classrooms versus ones used in technology labs. Nor does the data depict how computers are distributed within districts, schools, or classrooms. All computers in school are counted as being used for "instructional purposes" (National Education Association, 2008, p. 1) even if students do not have access to these computers.

School corporations are starting to rely on different types of technology in schools, using "public and private funds to buy more laptops" (National Education Association, 2008, p. 1).

Instruction and usage of technology goes beyond organizational elements, pointing to the role of the teacher as to successful implementation (Becker & Ravitz, 2001; Cuban et al., 2001). A study completed in New Zealand by Ryba and Brown (2000) found teachers' beliefs about their roles in classrooms, including their philosophy of education, framed how and to what extent technology was used. Instructional methods are by products of teachers' knowledge, skill, and teaching philosophy (Staub & Stern, 2002). However, without access to technology, teachers and schools can be limited. Despite the generous investment in, and increased presence of, computers in schools (Education Reform Studies, 2013), computers have been found to be unused or underused in most schools (Cuban, 1986; Cuban et al., 2001; Loveless, 1996). Therefore, it is important to understand the type access to technology, how technology is being used, and its effectiveness in schools.

Statement of the Problem

Reflecting on my teaching experiences, I appreciate the immeasurable impact and assistance technology has had on my ability to manage my grade book, create lessons, research, access teaching concepts, engage students, and so much more. I also realized the skills and knowledge needed in the 21st century depend heavily upon my ability to utilize technology in the classroom as a tool for teaching and learning. Access as well as usage of technology, however, does not halt with me, the teacher. Digital learning is at the forefront of many school improvement plans (Education Reform Studies, 2013). As well, for many students, technology provides an infinite amount of resources readily accessible. The question looms whether or not all this access and all this usage of technology in the classroom equates to effectiveness. I find myself asking, “Does using all these different forms of technology really make me an effective high school teacher?” And, when new forms of technology are introduced to me as well as other teachers, “Are we all utilizing this technology or does it sit around collecting dust, becoming antiquated like so many other underused teaching items?”

Despite greater access, cheaper cost, and twenty-first century digital functionality, the question remains whether or not technology elevates a high school teacher’s effectiveness in presenting lessons, managing various tasks, and/or engaging students. A study of high school teachers and technology patterns sheds light on the degree to which technology is accessed and utilized, allowing for a greater understanding of whether technology trends in high school likens to effectiveness.

One such reason there is more technology in schools is attributed to the technology revolution. In March 2007, Steve Jobs of Apple introduced what was labeled “[the] most advanced technology in a magical and revolutionary device at an unbelievable price” (Apple, 2007, para. 2). The device was the iPad, a tablet, which would allow users immediate access to a variety of apps and content in an attractive manner. Tablet usage will ultimately infiltrate American schools. A question surrounding the tablet technology usage is whether it is being used beyond the entertainment aspect (Apple, 2007). Of course, technology of any kind brings immediate enjoyment, access to information, and animation, but will usage of technology by teachers as a tool increase motivation and improve learning too? According to Education Reform Studies (2013), “The most common—and in fact, nearly universal—teacher-reported effect on students was an increase in motivation” (para. 4). The previously mentioned study highlights different scenarios where increased motivation had occurred. Students were, in some cases, during recess period completing “technology-based projects” (Education Reform Studies, 2013, para. 6). Educators are faced with the daily test of whether or not they are meeting the needs of all students in their classes. Because of the diverse learners in their classes and change in the type of learner, teachers have to implement a variety of lessons with limited resources (Education Reform Studies, 2013; Vrtis, 2010). Students now have a venue where they can excel in learning and collaborating, greater than the non-technological setting will provide (Britland, 2013). The question remains whether or not all this access to technology equals effectiveness.

Not only are there options in access to technology, but also greater usage for various activities. Teachers usually find lessons that are both likeable and educational. Technology, via a computer lab, tablet, one-to-one device, or a Chromebook is a tool that can be used to improve instruction in both of the aforementioned areas. Style, delivery and technique are significant aspects to a teacher's repertoire; however, technology allows teachers to provide content using various methods. Technology provides a remedy for lack of resources, time constraints, and engagement. Videos, documents, audio podcasts, and interactive images or apps will be available for learning (Britland, 2013). Other benefits that would appear in the classroom include variation in modes of delivery, creative lessons, and differentiation. One study identified that teachers were using a tablet device to complete many of the routine tasks in class "with greater ease" (Vrtis, 2010, p. 15). Some, but not a majority of the teachers used technology for "integration of electronic and digital resources, . . . classroom notes, assessment, and student responses" (Vrtis, 2010, p. 15). Teachers in this study felt technology impacted student learning as well as assisted for instructional purposes. The study concluded that tablet usage did not alters a teacher's pedagogy (Vrtis, 2010). The question remains whether technology usage alter how much or to what extent a teacher is using technology for various activities within the classroom?

Another area of inquiry regarding technology usage deals with aspects regarding how technology is assisting teachers. According to Honey and Moeller (1990), the question of how technology facilitates teaching and learning partially can be answered by means of a teacher's pedagogical beliefs on learning and instruction. Teachers who were *high-tech* created engaging activities for students that provided collaboration, project-based work, inquiry lessons, and discovery learning (Koc, 2005). Also, a teacher who instructs within a constructivist perspective versus traditional will benefit from technology usage in the classroom. The point of technology in the classroom is "not to 'teach with technology'" (Rosen, 2011, p. 13) but to use technology to convey content so students are engaged and in control of their learning. According to the Pew Research Center's Internet and American Life Project survey, benefits of technology usage in the classroom include greater collaborating among students, sharing among a wider audience, and increasing ingenuity among student work (Purcell, Buchanan, & Friedrich, 2013). In a survey of teachers in American middle and secondary schools completed by Pew Research Internet, it was determined technologies have become fundamental to "teaching and professionalization" (Purcell, Heaps, Buchanan, & Friedrich, 2013, para. 1). Teachers (92%) in this study cited the Internet as having a major effect on "their ability to access content, resources, and materials for teaching" (Purcell, Heaps, et al., 2013, para. 2). Although 69% stated the Internet has a "'major impact'" (Purcell, Heaps, et al., 2013, para. 2) on teacher collaboration as well as impacting communication with parents and students. Even though there is a perceived appearance of an impact technology has on teachers in the classroom, the question that needs to be addressed is whether or not this overall technology impact is truly resulting in effectiveness.

Purpose of the Study

The purpose of this quantitative study was to determine high school teachers' perceptions of technology effectiveness. A survey was created to analyze high school teachers' perceptions of technology effectiveness in the state of Indiana. The survey collected data from high school teachers, who provided their ages, genders, educational experience, type of technology usage, technology availability, how technology is being used, and perceptions of effectiveness in creation of lessons, delivery of material, and use of technology. The survey provided data to determine what access teachers have to technology, how much teachers are using technology, in what ways teachers are using technology, and teachers' perceptions of technology effectiveness.

Research Questions

Research questions provided an outline to help me develop and lay out the design in study for the purpose of organization, understanding, and importance. This quantitative study focused on the following seven questions.

1. What are current technology usage patterns within schools in the state of Indiana?
2. Is there a relationship between frequency of technology equipment usage and perceived effectiveness?
3. Is there a relationship between technology software utilization and perceived effectiveness?
4. Are there significant differences in teachers' perceptions and usage of technology based on age?
5. Are there significant differences in teachers' perceptions and usage of technology based on school enrollment size?

6. Are there significant differences in teachers' perceptions and usage of technology based on teaching position?
7. Do demographic factors predict a significant amount of variance in the teacher technology effectiveness score?

Null Hypothesis

Question 1 was addressed through descriptive analysis.

$H_0$1. There is no relationship between type of technology equipment usage and perceived effectiveness.

$H_0$2. There is no relationship between technology software utilization and perceived effectiveness.

$H_0$3. There are no significant differences in teachers' perceptions and usage of technology based on age.

$H_0$4. There are no significant differences in teachers' perceptions and usage of technology based on school enrollment size.

$H_0$5. There are no significant differences in perceptions and usage of technology based on teaching position.

$H_0$6. There is no variance in teacher technology effectiveness scores based on demographic factors.

Definitions of Terms

Many of the terms used are defined to ensure consistency throughout the results in this study.

A tablet, Chrome book or like *device* refers to a "computer and the associated special operating system is an example of pen computing technology which refers to a computer user-interface using a pen (or stylus) or finger, rather than devices such as a keyboard, joysticks or a mouse" (Kersarwani, 2009-2013, p. 2).

Digital content is the academic material delivered via technology. This is what students learn (Governor's Office of Student Achievement, n.d.).

Digital learning refers to learning that is taught via technology and provides students with an ability to make decisions about their own learning the direction it will go (Prensky, 2008).

Digital native refers to those born into a native culture where the digital world is in existence. These children are born in 21st century and can speak the *digital language* (Prensky, 2001).

Effective technology integration refers to technology instruction that supports curricular goals. The key components for learning with technology includes active engagement, participation in groups, frequent interaction and feedback, and connection to the real-world (Morrissette, 2009).

High school for the purposes of this study is defined as a public school in the state of Indiana with a grade combination of 9-12. In this study, large high schools are those with enrollments above 800 students, medium high schools have enrollment between 400 to 800 students, and small high schools are those whose enrollments are less than 400 students.

Net Generation and *iGeneration* refer to teens who use various technologies. The iGeneration can be identified as individuals who were born in the 1990s and after. Rosen (2011) stated, "The i represents both the types of digital technologies popular with children and adolescents (iPhone, iPod, Wii, iTunes, and so on)" (para.10).

One-to-one device can mean iPads, netbooks, laptops, e-readers, or any other mobile learning device (Hertz, 2011).

Student engagement or active learner refers to a student's desire to face academic challenge, collaboration learning, student-teacher interaction, and enriching experiences in education (Kenny, Kenny, & Dumont, 1995).

Self-paced learner or self-paced learning refers to independent learning that can occur within the confines of a classroom or in isolation. The learner makes the decisions regarding goals, content, amount of effort, time, and evaluation (Long, n.d.).

Technology is "the mechanism that delivers content" (Governor's Office of Student Achievement, n.d., para. 6). It assists in how students receive information and content, including "Internet access and hardware, which can be any Internet access device—from a desktop to a laptop to an iPad to a smartphone. Technology is the tool, not the instruction" (Governor's Office of Student Achievement, n.d., para. 6).

Twenty-first century education/twenty-first century skills refers to skills developed by children so they transition into work and life in the 21st century. Some of the skills necessary for the 21st century include creativity, critical thinking, communication, and collaboration. Another large element in the skills bracket is being able to access information, using a variety of media, and developed technology skills (Partnership for 21st Century Skills, n.d).

Limitations of the Study

The purpose of this quantitative study was to determine high school teachers' perceptions of technology effectiveness. The limitations are influences a researcher cannot control. First, this study was limited based on the number of teachers who responded to the study, making it difficult to draw generalizations about the overall population of high school teachers in the state of Indiana. However, this was only a limitation if low numbers participated in the study. However, 343 participants responded to the survey, and this number was neither low nor high. Second, the type of survey used was electronic, and this may have been a determinant in whether a teacher responded to the survey. This could apply to teachers who have limited access to computers, share classrooms and do not have their own computers, or even do not receive the survey because there is no computer available. The time of year the survey was being completed affected the number of responses returned due to the fact that teachers were very busy at the start of the school year and could see filling out a survey as something that was nonessential; therefore, teachers simply did not complete the survey. Last, a teacher composite total for the four technology sections was added together. This included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The composite scores were grouped together to provide a global perspective on technology. The composite total could be a factor in the data, possibly causing the data to be more robust.

Delimitations of the Study

Delimitations limit the scope, define boundaries, and are in the researcher's control. Delimitations for the study included the fact that the study was limited to public, secondary schools in the state of Indiana. In effect, there were no survey responses from teachers in private schools, elementary schools, or junior high schools. Second, the survey focused only on teachers' perspectives of technology effectiveness as well as current technology usage patterns in high schools in the state of Indiana. In narrowing the scope of focus to the latter, parameters for the study were established. The problem of focus was in high schools and how high school teachers perceive technology.

Significance of the Study

There has been some research on technology in schools; however, a majority of those studies available focus on critical factors or barriers and supports to implementation of technology in schools (Fabry & Higgs, 1997; Koc, 2005; Redmann, Kotrlik, & Douglas, 2005). As well, there have been some studies on teachers' perceptions of technology. A majority of the studies that reported benefits to using technology or 21st century devices were supported by organizations either attached to or supporting companies producing the product.

What This Study Did

Just as it is imperative to understand the habits of highly effective teachers, it was also imperative to understand current technology usage patterns in the state for the ultimate purpose of planning how to effectively implement a comprehensive technology plan. This study identified how teachers are using technology, amount and type of access to technology, and perceptions of effectiveness of said technology. Interestingly, Always Prepped (2012) identified *The 7 Habits of Highly Effective Teachers Who Use Technology*. According to Always Prepped (2012), a highly effective teacher who uses technology will always start with the why, will be malleable, will change and embrace change, will share, will think or will be extremely thorough and think two steps ahead, and will actively care. Therefore, it is necessary to understand why and how teachers are using technology.

Who Technology Helps and How

This study hopefully inspires, enhances, and impacts teaching and learning with technology, especially since more and more schools are relying on technology as a tool for teaching and learning (Education Reform Studies, 2013). According to an elementary school teacher,

> the computer has been an empowering tool to the students. They have a voice and it's not in any way secondary to anybody else's voice. It's an equal voice. So that's incredibly positive. Motivation to use technology is very high. (Education Reform Studies, 2013, para. 9)

More specifically, this study enables teachers to understand and see what technology is being used, why, and how it is being implemented into lessons. In *The 7 Habits of Highly Effective Teachers Who Use Technology* (Always Prepped, 2012), there are seven ways in which the dichotomy between teachers and technology are fused together to provide a greater understanding of the impact teaching and technology can make in the classroom. Teachers who start with the why or have a reason for using technology, "whether it saves them time, improves learning outcomes, or helps with lesson planning" (Always Prepped, 2012, p. 2), in order to create a substantial learning environment, or according to Always Prepped (2012), a highly effective environment. With the change in the role of the student from recipient of information to an active participant in decisions regarding "how to generate, obtain, manipulate, or display information," (Education Reform Studies, 2013, para. 1) teachers have to elucidate why technology is being used in the classroom.

Another valuable reason this study is useful for educators is due to how technology is used as a tool to enhance teaching. The fourth reason stated by Always Prepped (2012) in *The 7 Habits of Highly Effective Teachers Who Use Technology* is "they share, share, and then share some more" (para. 5). Another effect of technology usage is collaboration (Education Reform Studies, 2013). Technology, in a sense, has broken down the walls and allowed for collaboration among teachers as well as students. Teachers are able to collaborate with teachers across the country or the world (Always Prepped, 2012). In doing so, best technology practices and teaching practices are being exposed, willingly (Always Prepped, 2012; Education Reform Studies, 2013). Many technology-based projects and assignments encourage situations where students need to use a neighbor as a source. This study identified in what way teachers are using technology in their classrooms whether it is for the purpose of collaboration, for outside resources, research, completion of tasks, improve technical skills, or project/design purposes (Education Reform Studies, 2013).

Potential Impact on Educational Leaders

This study provides a basis for comparison in order to better understand whether an educator's own classroom, school, or corporation is effectively implementing, integrating, or using technology. Ultimately, this study provides further insight into how, why, and to what extent teachers are using technology in order to better prepare for future situations with technology, whether that means creating a comprehensive technology plan or simply replacing a form of technology in schools.

Currently, there is a shifting pendulum in education. The role of the educator has changed and continues to undergo changes indefinitely (Always Prepped, 2012; Collins & Halverson, 2009). A portion of the shift in education includes technology and the role technology has on teaching and instructing. Students today are considered digital savvy (Prensky, 2001). The educational environment is changing to meet the needs of its cliental. "The world of education is currently undergoing a massive transformation as a result of the digital revolution" (Collins & Halverson, 2009, p. 1). Due to the latter points, the need for a greater understanding of technology and teachers' access, usage, and effectiveness is imperative for successful teaching and learning. The current study provides a depiction of teachers' perceptions of technology in their classrooms. Teachers provide a picture of how technology is being used, to what extent technology is being used, and where and when technology is being used, along with its effectiveness.

CHAPTER 2

REVIEW OF LITERATURE

With the adage for those living in the 21st century, “The World is Flat,” has come an understanding of how technology will keep Americans abreast in the global market as well as maintaining a competitive educational system (Wehling, 2007). To sustain this competitive nature, many schools, educators, and families have been proponents of technology. Specifically, the use of tablets or a device of the like in American classrooms is on the increase (PBS LearningMedia, 2013). Due to cheaper costs and production of quality products available, one-to-one devices or the like seems to be offering students and schools the benefit of Internet services while at school and home (Clarke & Svanaes, 2012). The predicted statistics for tablet shipments in 2013 is around 172.4 million units and then increasing to the possibility of 282.7 million units in 2016 (Mobicip, 2013)). Because more technology and services are available, schools are seizing the opportunity with changing tides to implement as much new technology for students and teachers, while keeping in mind the ultimate goal of improved student learning.

The purpose of this quantitative study will be to examine teachers’ perceptions of technology effectiveness in high schools. Specifically addressed in the study will be the type of access to technology: Chromebook, iPad, one-to-one device, tablet or like device, standalone computer, Smartboard, social media, computers on carts or computer lab access. Another area of focus in the study will be how teachers are using technology-software usage and student software usage. Last, this study will address teachers' perceptions of technology effectiveness in schools.

An effective 21st century education requires a teacher to have knowledge of how to use technology in the classroom as a tool for instruction and learning (Gorder, 2008; Sheingold, 1990). According to a survey completed by PBS LearningMedia (2013), "three-quarters of teachers surveyed link educational technology to a growing list of benefits" (para. 1). Not only is it important that teachers have access to technology, but also it is important how teachers are using technology. Because students are growing up as tech-savvy, digital natives (Elliott, 2013; Prensky, 2001; Rosen, 2011), educators will need to continue to embrace the idea of technology and continue to be trained on how to most effectively use as an educational tool (Gorder, 2008; Sheingold, 1990). The *how* teachers are using technology can be dependent on different variables: professional development training, pedagogy, self-efficacy, and technical support are just a few (Bandura, 1989; Becker, 1994; Koc, 2005). Even teachers who have had some professional development and/or pre-service training can feel inadequately prepared to implement technology (Loveless, 1996; Ponessa, 1996; U.S. Department of Education, 2005). With necessary technology training, teachers adopt or create optimistic feelings about the integration of technology into classrooms and may be more likely to use technology in the classroom (U.S. Department of Education, 2005). Cleary, technology has become infused in classrooms. "The National Center for Education Statistics reported in 2009 that 97 percent of K-12 teachers had computers in their classrooms every day" (Lynch, 2013, para. 2). In the PBS LearningMedia (2013) survey, teachers responded to how they were using technology: 48% were using technology for online lesson plans, 45% were using technology for web-based interactive games and activities, 44% were using websites to deliver class information, and 43% were using online videos, images, and articles.

Schools are educating a different type of learner than 20 or even 10 years ago, and new demands of accountability are ubiquitous in education. Literature shows using technology in classrooms can provide a range of innovative ways to teach and learn (Clarke & Svanaes, 2012). This study will not only look at how teachers are using technology, but also whether it is an effective aspect of teacher instruction. Teachers surveyed through PBS LearningMedia (2013) stated technology enabled teachers "to reinforce and expand content (74%), to motivate students to learn (74%), and to respond to a variety of learning styles (73%)" (para. 1). In this same survey, 69% of teachers surveyed stated educational technology had allowed them to exceed beyond previous standards (PBS LearningMedia, 2013). Teachers need to be using technology as a means to increase students' learning, access resources faster, enrich instruction, and customize instruction (PBS LearningMedia, 2013; ProCon, 2014).

Through the use of technology, students will be able to continue learning while at home. In doing so, this could encourage student and parent interaction, and allow for unlimited access to the Internet as well as constant access to school online resources such as collecting assignments, checking grades or communicating with teachers (Britland, 2013). Although not limited to the latter benefits solely, students would also have other entertainment options available through the use of different types of technology.

The benefits to learning in conjunction with technology seem straightforward and practical. Students could have the capacity to research a topic at any given time, allowing more independent inquiry to occur within a classroom. Even specialized lessons or differentiated lessons could be more accessible and easier to manage through various forms of technology.

Students with special educational needs could use a tablet or like device easily due to the simplicity and touch screen interface (Clarke & Svanaes, 2012). Then, of course, would be the practicality of many new hand-held devices, potentially cutting costs on paper and eliminate the problems associated with carrying around heavy textbooks (ProCon, 2014). Because technology is not a single fit scenario (Gorder, 2008; Wepner, Tao, & Ziomek, 2006) where all schools possess the same type of technology or have the same access to technology, educators, stakeholders, and policy makers need to understand perceptions of technology, access to technology and technology effectiveness in order to find ways to use technology and enhance learning.

The review of the literature focuses on the historical development and use of technology in education. This includes specifics on availability of technology, the digital generation and teachers using technology as tools for instruction, independent learning in the 21st century, and current studies underscoring usage of technology in the classroom.

Process for Searching and Choosing Articles Connected to the Study

To complete a thorough search of literature for the study, a list of key words and phrases were developed to help focus the study. Key words and phrases connected to the study included technology and teaching, teachers' perceptions of technology in the classroom, teachers' access to technology, teachers' usage of technology, technology in schools, technology in education, effective technology instruction, one-to-one devices, tablets and learning, digital natives and digital learning. The review of literature is comprised of an abundance of sources from the following: educational and technological journals, educational periodicals, web searches, dissertations, ERIC, ProQuest, reference books, the Indiana State University Cunningham Memorial Library, and technology studies completed by various organizations.

History of Technology

Reliance on books can be traced as far back as the Mesopotamian era when individuals were pressing a reed into a lump of wet clay (Hilgedick, 2013). Fast forward to 1790 when the teacher took over as the primary facilitator of information. In the 1920s, "Textbooks of the Air," otherwise known as radio, became a way to access instant information about current events and trends (Cuban, 1986). Continue moving on to 1946 when the first vacuum tube-based computers were developed. Eventually, the Rand tablet and known by some as the Grafacon or Graphic Converter, "was one of the earliest tablet computers" (Huffington Post*,* 2010, para. 5).

Considered pioneers in 1963, John Kemeny and Thomas Kurtz, who worked at Dartmouth, changed a parochial perspective. Computers were being used strictly for research purposes, and these men created a concept of computer usage for academic purposes as well (Molnar, 1997). The two are responsible for developing a "time-sharing [concept] that allowed many students to interact directly with the computer" (Molnar, 1997, para. 15). Because students had to stand in lines for "batch processing" (Molnar, 1997, para. 15), the two men developed a new written machine language called "*BASIC*" (Molnar, 1997, para. 15) which spread quickly and allowed computer-based instructional materials for a variety of subjects to be.

At Stanford in 1963, Partick Suppes and Richard Atkinson developed a program for computer-assisted instruction (Molnar, 1997; Taylor, 1980). Their program was based on "research and development on computer-assisted instruction in mathematics and reading" (Molnar, 1997, para. 16). They developed an individualized program that provided strategies to allow the learner to correct his or her answers based on feedback versus group-paced instruction (Molnar, 1997).

During the 1970s, Seymour Papert developed a new concept for computers in education (Molnar, 1997). Papert created the programming language renown as LOGO in order to help rigorous thought in the field of mathematics (Molnar, 1997). Papert stated, "We should not teach mathematics, but should teach children to be mathematicians" (as cited in Molnar, 1997, para. 18). Papert's work with LOGO extended to work with LEGO, "building computer-driven LEGO constructions, so the student learns to define a problem and the tacit practical problem-solving skills needed to solve it" (Molnar, 1997, para. 18). Papert's work supported a constructivist approach to learning. Through computer fluency, the application of computers to solve problems, the learner was constructing a meaningful product (Harel & Papert, 1991; Molnar, 1997).

During the late 1960s, the National Science Foundation backed the development of "30 regional computing networks, which included 300 institutions of higher education and some secondary schools" (Molnar, 1997, para. 19). In 1963, only 1% of secondary schools accessed and applied computers for purposes of instruction. Schools with access to computers increased by approximately 50% in 1975 and 23% of schools were using computers for instruction (Molnar, 1997). At this time, computers were "expensive," and educators had "purchased time-shared systems and adopted procedures to ration or restrict usage to provide access to as many people as possible" (Molnar, 1997, para. 20).

Alan Kay formulated his Dynabook beginning in 1972 on paper: "a personal computer for children of all ages" (Kersarwani, 2009-2013). According to Molnar (1997), 1975 marked the moment when time-shared computer systems shifted to lower-cost microcomputers, starting the personal computer revolution. Technology made its way into many schools in the year 1980; "Before the advent of microcomputers in the 1980s, mainframe computers were used to deliver drill and practice and simple tutorials for teaching students lessons" (Jonassen, Howland, Marra, & Crismond, 2010, para. 2). The microcomputers were used in the same capacity according to a 1983 survey of computer uses in schools (Jonassen, Howland, Marra, & Crismond, 2010). In the late 1980s, schools and educators began to see how technology could be used as a tool for learning in the areas of "word processing, databases, spreadsheets, graphics programs, and desktop publishing" (Jonassen et al., 2010, para. 3). In a study completed in 1993 by Hadley and Sheingold, teachers were using computers as a tool to serve mostly word processing needs, information tools, and graphics (Jonassen et al., 2010).

The first fully automated classroom environment (FACE) is known to have started in August of 2009 in Aurora, Illinois ("History of Educational Technologies Timeline," n.d.). Students in this classroom were exposed to class through a wall-sized LCD display whether notes and assignments were displayed. As well, "graphs and diagrams could be displayed in a clear form, as well as pictures, and even three-dimensional images depicting real-world applications" ("History of Educational Technologies Timeline," n.d., para. 5). Students were taught class with visual representations, had access to digital audio recordings of lectures, and could access diagrams and pictures for additional help. Students in this class were allowed to take their notes, to complete their quizzes and tests via an individual notepad, which was compared to the popular palm pilots. These notepads had "handwriting recognition software calibrated to the individual student, eliminating the problems of messy assignments" ("History of Educational Technologies Timeline," n.d., para. 6). The assignments could be downloaded to home computers, allowing access to students' work outside the school parameters.

Microsoft is responsible for the creation of the tablet pc concept for business known as *fieldwork*. For a period of time tablet usage was low due to price and problems with the product.

In 2010, Apple introduced the iPad to the market, which allowed for an "emphasis on media consumption" and "increased usability, battery life, simplicity lower weight and cost, and overall quality with respect to previous tablets, was perceived as defining a new class of consumer device and shaped the commercial markets for tablets in the following year" (Kersarwani, 2009-2013, pp. 2-3). According to Lane (2006), the evolution of the tablet began with the stone table, moved to the wax tablet, then the slate tablet, and ends with the silicon tablet. The introduction of tablets to schools came shortly after the introduction of Apple's iPad in 2010. Three secondary schools included in a study completed by Clarke and Svanaes (2012) during the 2011-2012 school year were Honeywood, Longfield Academy, and Wallace High School. Because technology has evolved rapidly over the last decade, technology—tablet and devices of the like—are being used in place of textbooks and as tools for learning in schools.

Digital Learners and Schools

The history of technology demonstrates a circular plot. Tablets were used once as a means for inscription while currently in the 21st century tablets again are being used as a means of communication. The theme of evolution carries over to the field of education and students. Education has been transforming over the last five years as a result of the digital revolution (Collins & Halverson, 2009). Students are learning through the use of various types of technology. Technology is a relatively new learning niche enabling teachers, schools, and students a way to develop and pursue learning on a timetable that fits each student's individual needs (Rock, 2012). One of the issues at hand is the redefinition of a child as learner. November (2009) stated the concept of a student learner has changed into someone who is a contributor or someone who is doing his or her own work. This type of learner requires a shift of control or responsibility from teacher to student. Children now research, reflect, and write using technology to study what is of interest to themselves. The student is the doer of the work initiating at the start using “top-down directives with bottom-up input” (Prensky, 2008, p. 6).

Students using technology in the 21st century are a part of the digital generation. These students have been labeled digital learners. Digital learning is defined as “learning facilitated by technology that gives students some element of control over time, place, path, and/or pace” (Governor’s Office of Student Achievement, n.d., para. 1. Key elements included along with the definition should be noted and those elements are technology as a mechanism for delivery of the content, the digital content which happens to be academic material students learn, and educators’ role changing from the *sage on the stage* to *the guide on the side* (Governor’s Office of Student Achievement, n.d.). Other names for the digital generation include digital natives and The Net Generation. A person born during the establishment of digital technologies is said, generally, to have a greater understanding of technology (Prensky, 2001). The latter depends greatly on socioeconomics, so not all students will be digital minded (Digital Natives, n.d.). Exposure and instruction of technology are still necessary whether a student is a digital learner or not. Understanding how to use Facebook and cites of the like does not mean students will know how to effectively search for an article or journal online (Digital Natives, n.d.).

Educators are no longer able to disregard technology and need to find ways to integrate it into lessons and classes. Prensky (2001) stated teachers need “to learn to communicate in the language and style of their students” (p. 4). Teachers need to be able to mesh together the *legacy* content, reading, writing, arithmetic, logical thinking, and the history of writing, with the *future* or technology. With technology schools and teachers are able to customize lessons (Collins & Halverson, 2009). No longer are the days of uniform learning necessary or even relevant. Students with particular interests can easily access needed information at a given notice. A benefit to customization is student engagement. Along with customization of learning comes access to diverse sources. The teacher is no longer the sole expert on all information. Students need to learn how to learn and find information and resources for different assignments. Students will have the ability to learn by doing (Collins & Halverson, 2009).

Research completed by Prensky (2001) explained the changing role of students in schools. For schools to understand why technology is needed as a tool for teaching and learning, it is important to understand the changing students and their needs. Prensky's research underscored the type of student in schools currently as well how schools tend to use antiquated techniques when dealing with the Net Generation. "Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language" (Prensky, 2001, p. 2). In other words, it is imperative for teachers to make connections with their students, and Prensky (2001) purported one avenue teachers should use is teaching with technology.

Technology is changing *what* and *how* students learn. Students and teachers have to determine and evaluate new literacies that become available. Because of the former, teachers need to spend time teaching students how to find information, determine if more information is needed, and evaluate what is in front of themselves. Providing students with proper instruction on technology, especially if the goal is to have a successful digital learner, is imperative (Digital Natives, n.d.). The 21st century learning embodies an approach to teaching that meshes content, skill and technology. Not only is there a shift in the role of the student, but so too, the role of the teacher. In many cases, the role of the teacher has transitioned to that of a facilitator (Sheingold, 1990). Meaning, teachers are interacting with more students and conducting less lecture-type lessons.

Current Status of Technology in High Schools

"Teachers need to integrate technology seamlessly into the curriculum instead of viewing it as an add-on, an afterthought, or an event" (Hayes-Jacobs, 2010, p. 28). Hayes-Jacobs questioned whether students feel they are in a time warp once they enter school each day. Jacobs even questioned if students feel as if they have returned to the 21st century once they have left school premises. To address and meet the demands of a changing world, educators need to be purposeful in how to best address the needs of digital learners.

What is a Technology?

Educators are addressing the needs of diverse learners through usage of technology, tablets or like devices, in the classroom (Rock, 2012). Technology is "the mechanism that delivers content" (Governor's Office of Student Achievement, n.d., para. 6). It assists in how students receive information and content, including "Internet access and hardware, which can be any Internet access device—from a desktop to a laptop to an iPad to a smartphone. Technology is the tool, not the instruction" (Governor's Office of Student Achievement, n.d., para. 6). Another commonly used piece of technology in the classroom is a tablet. A tablet is similar to a computer and has similar technological features. A tablet can be defined as a "computer and the associated special operating system is an example of pen computing technology which refers to a computer user-interface using a pen (or stylus) or finger, rather than devices such as a keyboard, joysticks or a mouse" (Kersarwani, 2009-2013, p. 2). Even though the place for textbooks in schools is facing a number of growing problems (Art Institute of Pittsburg-Online Division 2013), the current status of tablet usage in schools "is still far from common" (Bacon, 2013, para. 3). According to an independent survey of K-12 teachers in the United States by E-Books and Kids, 78% of the educators surveyed reported that there was no tablet usage at individual schools

(Bacon, 2013). In this same study, 10% of the individuals responded by saying they had tablets in the classrooms for students. Educators further say that the ideal way to use tablets is one-to-one and that is stated as rare in this survey. However, this is the most ideal way for usage because students can interact directly with the screen and write directly upon the screen with a stylus (Foster, 2003).

Functionality and Flexibility of the Technology

Technology can be functional if the infrastructure of the school is properly set-up (Rock, 2012). Wireless communication and a digital projector will allow a teacher the ability to move around a room and teach using technology. With mobility and proximity, a teacher has greater chance for interaction with students while having the ability to manage the classroom. When a teacher uses technology as a tool to teach, he or she sheds the traditional cloak of having to stay behind a desk and solely lecture students.

The flexibility of technology allows teachers and students to perform a wide range of activities during class (Amirian, 2004). Technology in classrooms allow for a variety of lesson ideas and are not limited to the following: note taking, drawing, writing, digital images, concept maps, interactive lessons, instructional sites, quizzes, reading, and much more (Rock, 2012). Teachers can create lessons using a variety of programs including the ability to digitally convert handwriting (Hursh, 2013).

Technology such as tablets and like devices are appealing to educators due to how the device can fit into the classroom with limited distraction (McManis, 2012). The usability of the device and multiple options allows for various types of learning occur in one setting or even collaboration to take place in one setting. Learning by the students on technology can provide for a smooth transition from one activity to another (McManis, 2012). Current studies document that kids are drawn to touch-driven, interactive technology. A number of advantages occur from a teacher using tablets in the classroom. Student engagement is an advantage that comes from interaction with technology, decreased time learning activities, increased retention of knowledge (LearnPad, 2013). An additional benefit to the flexibility of technology is that usage of tablets, or like devices in classrooms offers variety or change from the traditional use of the occasional antiquated computer labs in schools (LearnPad, 2013).

Access to Technology

Seemingly new technology is introduced to the general public on a daily basis; therefore, not surprisingly teachers in schools appear to have some type of technology available. In the PBS LearningMedia (2013) survey, "ninety percent of teachers surveyed have access to at least one PC or laptop for their classrooms" (para. 5). The survey performed during 2009 by National Center for Education Statistics (NCES) found 97% "of teachers had one or more computers located in the classroom" (Gray, Thomas, & Lewis, 2010, p. 3). Fifty-nine percent of teachers have availability to whiteboards and "one-third (35%) of teachers said they have access to a tablet or e-reader in their classroom" (PBS LearningMedia, 2013, para. 5). According to the NCES survey, 54% of teachers could bring computers into their classrooms (Gray et al., 2010). Interestingly, a ratio of 5.3 to 1 for students to computers in the classroom was noted in the latter survey.

The type of technology available everyday or as needed in the classroom ranges from projectors, digital cameras to interactive whiteboards. In the NCES survey, it was noted that 36% of teachers had access to LCD (liquid crystal display) projectors and 48% had access to DLP (digital light processing) projectors (Gray et al., 2010). Interactive whiteboards were documented as being available as needed in 28% of the classrooms and 23% of the classrooms every day (Gray et al., 2010). Camera options ranged from digital camera to document camera; however, the digital camera was available as needed in 64% of classrooms as needed or in 14% of classrooms every day (Gray et al., 2010). Access to technology might also include computer labs, handhelds (including cell phones, smart phones, iTouch phones), tablets and electronic readers (iPad, Kindle, etc.), and interactive tables or Smart tables (PBS LearningMedia, 2013).

Technology Uses

Research supports the idea that several factors can influence whether a teacher is prepared to use technology in the classroom (Koc, 2005); however, the how or reason a teacher decides to use technology can vary from creating lessons to creating peer collaboration scenarios with technology (Education Reform Studies, 2013). Firstly, a teacher may be using technology with a goal to encourage active learning, allowing students to "generate, obtain, manipulate or display information" (Education Reform Studies, 2013, para. 1). Students will actively be engaged in their learner, no longer taking a passive role. Teachers who understand how "to communicate in the language and style of their students" have assumed the role of a facilitator while the student is in control of his or her learning (Piaget, 1955; Prensky, 2001). This usage of technology provides students the chance to be active learners, active thinkers, active in choices and skills (Education Reform Studies, 2013).

The role of the teacher has changed too. A teacher is no longer the "dispenser of information" (Education Reform Studies, 2013, para. 2) but rather a facilitator (Piaget, 1955). As a facilitator, the teacher will set goals, provide guidelines, assist with resources, and move from group to group "providing suggestions and support for student activity" (Education Reform Studies, 2013, para. 2). As facilitator, the teacher takes on a coaching role, rotating around the classroom, looking over shoulders, asking questions about various designs and even providing guidance when needed (Education Reform Studies, 2013). According to Education Reform Studies (2013), technology as a tool for learning is compatible with the facilitator role. In addition, the mantra “teacher as expert” (Collins & Halverson, 2009, p. 2) will ease due to the use of technology, allowing technology to provide “diverse knowledge sources” meaning computers will provide a variety of sources and expertise. Teachers have turned to technology as an avenue to fulfill the role of the facilitator.

Another valuable effect of technology is collaboration. According to Education Reform Studies (2013), “a great majority of teachers” are using technology as a means to allow students to work cooperatively and to provide peer tutoring (para. 11). Technology tasks encompass subtasks such as: creating proper formatting or creating tables, naturally leading to scenarios where students assist each other (Education Reform Studies, 2013).

In the PBS LearningMedia survey (2013), teachers indicated a number of reasons how they were using technology into their classrooms, “48% of teachers surveyed reported using technology for online lesson plans, and just under half use technology to give students access to web-based educational games or activities (45%)” (para. 4). Teachers are also using technology to show or demonstrate a lesson they are unable to do so any other way PBS LearningMedia, 2013). According to the latter survey, teachers use technology for a 21st century curriculum to bring lessons to life. In the NCES survey from 2009, teachers reported sometimes or often using technology for the following instructional or administration reasons: word processing (96%), graphing and spreadsheets (61%), software for grading and records (80%), software for presentations (63%), and the Internet (94%; Gray et al., 2010).

Variables Related to Technology Usage

Teachers either fail to implement technology or incorporate its usage based on several factors. According to Brinkerhoff (2006), several key hindrances could arise when it comes to incorporating technology such as support, training and experience, personality factors, as well as resources. The British Educational Communications and Technology Agency (2003) defines barriers as “any factor that prevents or restricts teachers’ use of technology in the classroom” (para. 1). Technology unavailability can also be an important factor limiting the use of technology in the classroom (Redmann & Kotrlik, 2004). Any number of demographic factors can affect whether teachers use technology in schools, specifically age, teaching experience, gender, content area, and school enrollment (Bebell, Russell, & O’Dwyer, 2008; Van Braak, 2001).

In a study by Abbot and Fouts (2001), it was discovered that more than half the teachers examined did not regularly use technology in teaching and learning situations. The lack of technology use in teaching and learning could be connected to fidelity in innovations. When individuals adapt to change or even adopt change, it can be based on whether individuals value the new approach (Rogers, 2003). There is a long line of research supporting factors, which are derived from teachers’ beliefs and attitudes (Chen, 2008; Lumpe & Chambers 2001).

Age and Teaching Experience

Achieving technology amalgamation with classroom instruction can be a tedious process in which many factors come into play, specifically demographic variables (Kotrlik & Redmann, 2009). According to Waugh (2004), teachers’ utilization of available technology decreased as age increased. There is some contradictory research on the impact age has on technology implementation. For instance, Inan and Lowther (2009) concluded in a study on technology integration that age did not have a significant impact on technology utilization in k-12 classrooms. However, in a path model study by Mathews and Guarino (2000), demographic characteristics were used to explain teacher's usage of technology. In the latter study, data collected from approximately 3,000 teachers in Southeastern Idaho, researchers found gender, years of experience, computer access, as well as computer proficiency had a direct effect on technology usage (Mathews & Guarino, 2000).

Another variable influencing whether or not technology is used in the classroom is teaching experience. A lack of teaching experience in technology utilization has resulted in the circumvention of technology usage by teachers (Mumtaz, 2000). A study by NCES stated that less experienced teachers were more likely to apply and operate technology than teachers with more teaching experience (Smerdon et al., 2000).

Gender

Studies related to gender and technology usage by teachers in the classrooms are limited. There are studies that purport gender has little or no effect on teachers' perceptions of technology (Harris & Grandgenett, 1999; Rosen & Maguire, 1990; Rosen & Weil, 1990). When studies use a multidimensional method and delve into other factors along with gender, diverse results are provided (Whitley, 1997). In a study by Anderson (1996) on computer anxiety, it was concluded gender was a significant factor in determining differences in computer anxiety. However, there are findings that suggest no relationship exists between gender and perception of technology. A study by Kotrlik, Redmann, Harrison, and Handley (2000) determined gender did not explain the discrepancy in "the value placed on information technology by agriscience teachers" (as cited in Kotrlik & Redmann, 2009, p. 2). Current studies regarding gender and technology implementation support no significant difference between males and females in relation to technology integration. In Gorder's study (2008), no significant differences were found in the means of males and females when addressing technology implementation and usage.

Self-Efficacy and Teaching Position

Although limited information exist on perceptions of technology and teaching positions, in a study by Wolters and Daughtery (2007), it was noted teachers are most impressionable in the early stages of their careers and become established as they gain experience. It is more difficult to change a teacher's belief system without some kind of shock, leading to reassessment. According to Bandura (1997), one of the most commanding sources of self-efficacy is mastery experience. Research suggests that experienced teachers' mastery experiences allocate time to improve favored learning styles (Blackburn & Robinson, 2008). Wolters and Daugherty (2007) found experienced teachers were more confident in managing instruction and assessment practices, benefitting all types of students. Experienced teachers were more likely capable of handling difficult confrontations with ease and even minimize these potential confrontations. In a study, Hoy and Tschannen-Moran (2007) concluded experienced teachers demonstrate higher mean scores of self-efficacy than new teachers. Even though research corroborates that experienced teachers have higher levels of self-efficacy, many researchers suggest this could be due to lower level teachers leaving the profession (Hartfield, 2011; Swan, Wolf, & Cano, 2011).

Carrying the latter over to technology usage, self-efficacy is a barrier that must be overcome for teachers to integrate technology (Ertmer & Ottenbreit-Leftwich, 2010). If researchers and practitioners do not have a lucid understanding of the connection among teacher self-efficacy and technology integration in classrooms, they may support uses of technology that are not effective. Evidence suggests self-efficacy could be an essential skill among teachers implementing technology in their classrooms (Ertmer & Ottenbreit-Leftwich, 2010).

Another variable that could affect technology usage is teaching position and/or discipline. Redmann and Kotrlik (2004) found teachers in certain teaching positions were experimenting various methods for technology usage in teaching and learning situations. Agriscience, business, and marketing teachers were trying to find ways to implement technology usage scenarios for improved learning and teaching (Redmann & Kotrlik, 2004). In a study by Guidry and BrckaLorenz (2010), differences were noted among various disciplines, albeit few. For instance, it was reported that faculty in specific disciplines used more varying technology; "professional and Education faculty used many of these technologies more often than other faculty" (Guidry & BrckaLorenz, 2010, p. 9). Overall, the results in this study found "the average frequencies of use of these three technologies [blogs, collaborative editing tools, and games and simulations] are virtually indistinguishable across the disciplines" (Guidry & BrckaLorenz, 2010, p. 9).

School Enrollment Size

When school size is mentioned in connection with different studies, it often is obscure. Specifically, school size can vary from setting to setting and person to person. An urban school might equate to a large school in a rural district. To delineate further and for the purpose of this study, suburban schools will be those outside a principal city and within an urbanized area with a population of at least 50,000. Rural schools are those in territories more than 25 miles from an urbanized area. In this study, large high schools are those with enrollments above 800 students, medium high schools have enrollment between 400 to 800 students, and small high schools are those whose enrollments are less than 400 students (Cotton, 1996).

School enrollment size is a factor that can potentially affect teachers' usage of technology in classrooms. Recent research has focused on school size as a factor in technology usage (Hargreaves & Fink, 2000; Lee & Smith, 1997). When comparing small schools to larger ones, issues that delineate the two include bureaucracy, amount of support, and rapport between teachers and students (Lee & Loeb, 2000). The former items become potential barriers to obtaining social and technical resources necessary for technology integration.

Effective Teaching with Technology

An important element in technology implementation is its correlation to teaching effectiveness. According to Hadley and Sheingold (as cited in Becker, 1994), technology is helpful to teaching and learning when teachers can integrate it as a tool in everyday practice in the classroom as part of said discipline's curriculum. Effective teaching with technology involves "readily and flexibly incorporating technologies into their [teachers'] everyday practice in relation to the subject matter they teach (Koc, 2005, p. 4). Teachers should integrate technology for the purposes of "(a) engaging students in active learning, (b) relying lesson on whole-group instruction, and (c) encouraging more independent and self-motivated learning" (Koc, 2005, p. 4). In 1999, Lu and Molstad specified ways technology integration in the classroom could increase curriculum instruction. Among the ways to improve instruction effectiveness with technology were uses of multimedia packages that promote group activities and discussions, telecommunication tools that provide for student-teacher communication and collaboration with peers, and problem solving challenges, and technology that encourages student learning. Not only has technology been an avenue for teachers to teach with effectiveness, but also has had positive effects on students and learning (Institute for the Transfer of Technology to Education, 2002).

Technology Research Completed

In perusing studies on technology usage in classrooms, several factors appear. First of all, a moderate number of studies on technology have been completed. These studies provide insight and perspective on technology usage in schools, but concerns over whether generalizations can be transferable to schools in the United States appear. This is not surprising since technology sales continue to grow and tablet projects continue to grow in countries of South Korea, Thailand, Turkey, and Brazil (Drinkwater, 2013). Second, some sponsors for studies are companies responsible not only for marketing tablets, but also production. The latter brings into to question the motivation behind those studies and whether or not the results will be fairly portrayed. New information is essential to ensure that technology integration by teachers reaches effectiveness and has impact. This study was designed to determine how high school teachers' perceptions of technology.

Pearson Foundation Study

According to a study completed by the Pearson Foundation in 2012, there was an increase in tablet usage for high school seniors from 4% in 2011 to 17% in 2012 (Pearson Foundation, 2012). In this study completed by the Pearson Foundation, the results stated that a majority of college students have a preference of digital books to the traditional form of print books. This study focused on students' perceptions of mobile technology through a direct interview. The goal of the study was to "track students' use, acceptance, and preferences when using mobile technology" (Pearson Foundation, 2012, para. 2). Key findings from this online poll of 1,214 college students and 200 college-bound high school seniors that was conducted in 2011 by Harris Interactive stated, "College students believe that tablet computers will transform learning. A majority of students in both college and high school are interested in owning a tablet. College students who own tablets believe that the devices are valuable for educational purposes" (Pearson Foundation, 2012, para. 2). Last, those who own the digital books tend to prefer the digital options to the traditional. The Pearson Foundation study is important because it demonstrates the state of the students and their preferences, which could directly affect teachers and teacher instruction. An increase in usage could mean an increase in the expectation of schools supporting tablets in classrooms.

Tablets for Schools Study

Another key study completed in 2011-2012 evaluated the possibility of giving students in secondary schools one-to-one tablets (Clarke & Svanaes, 2012). The research was done between September 2011 and July 2011 of three secondary schools in the United Kingdom that had chosen to give students one-to-one tablets. The study included interviews with school leadership and observation of tablet learning in a range of subjects. Included within the study were 18 focus groups made up of different stakeholders. The stakeholders in focus groups included students, parents and teachers. Key findings from the qualitative study suggest several benefits to learning: increased motivation to learn, increased parental engagement, efficiency in monitoring student progress, and increased collaboration (Clarke & Svanaes, 2012). It was also noted that tablets seemed to offer a "sense of inclusion that allow children, irrespective of socio-economic status or level of attainment" (Clarke & Svanaes, 2012, p. 4). According to this study, students using one-to-one tablets thrive in this new model of student learning. A belief of those in this study is that tablets "will be universally adopted as a learning device in schools" (Clarke & Svanaes, 2012, p. 5).

The Clarke and Svanaes (2012) survey was funded in part by Apple, Inc. Though the tablet was introduced in 2010, many schools are turning to introducing tablets in place of traditional textbooks (Elliott, 2013). In the current year of 2012, tablets and like devices have increased in popularity while being infused into the educational arena (Pearson Foundation, 2012). There are overwhelming reports on benefits of students using tablets but little documentation on teacher perceptions of tablet effectiveness in the classrooms.

This study shows the effects technology has on teachers' lesson development and instruction. This study highlights whether teachers feel students are more involved, driven, and self-directed. Another aspect underscored is whether teachers are using technology in the classroom beyond a tool for the creation of lessons but also for differentiation of presented material. The results of this study could be used to prepare for the challenges of implementing technology usage in schools to help determine if schools and/or teachers are effective in improving how lessons are created and how lessons are presented. With the rapid changes in technology, schools have been directed to incorporate as much technology as possible in the school environment (Clarke & Svanaes, 2012).

The Effects of Tablets Study

Yet another study Vrtis (2010) reviewed effects tablet computers have on the pedagogy of instructors and students' perspectives of the instructional uses of the tablet. The purpose of my study is to examine whether or not the tablet is a viable option for schools to implement, looking at what the tablet offers, financial considerations, instructional value, perspectives on tablets from instructors and the integration process. The school used in the study was a single school with two campuses—a high school district in a suburb of Chicago, Illinois.

This qualitative study looked at both student and teacher perceptions on how tablets impact classroom instruction. An 18-question survey is used with a Likert scale and section for open response. Among a list of questions, a focus was on changes in pedagogy and changes teachers notice in the student learner. Teachers analyzed individual instruction according to the categories of "collaborative learning, problem-based learning, discovery learning, active learning, and lecturing (Vrtis, 2010, p. 10). Observations were made by Vrtis (2010) to obtain narratives of different types of instructional lessons use with tablets. Students completed a 10-

question Likert scale survey where they responded with their perception of tablets in the classroom.

The study was separated into two main sections: lesson implementation and preparation. The conclusion of the study found the following results for lesson preparation: 94% of teachers used tablets for research materials on a daily or weekly basis and 82% of teachers used the tablet for creating instructional materials, whereas, only 46% of teachers use tablets for assessment in the classroom. Interestingly, only 23% of teachers used tablets as a means of exploration (Vrtis, 2010). When the tablet is used as a tool, 93% of teachers use it three times or more a week. The tablet is used to review assessment material by 60% of teachers. Note-taking demonstrations were used in 80% of classrooms. Additionally, 76% of teachers believed tablet usage increased participation by low-motivated students (Vrtis, 2010). The study concluded there was a positive effect on teacher instruction when using a tablet. However, teachers seemed to simply replace old tools for instruction with a new one, not really changing technique. Teachers felt students were more engaged and motivated with the tablet. Teachers were using the tablet to create new materials, but presenting materials similar to the style of an overhead projector.

According to the study, students, too, felt tablets helped with organization and understanding. However, students did not feel teachers were presenting an increased variety of lessons, nor did they feel more engaged. Students did not notice a change in teacher pedagogy when it came to tablet usage (Vrtis, 2010).

National Center for Education Statistics

The Office of Educational Technology (OET) in the U.S. Department of Education asked the NCES to assist in finding national data focused on availability and use of educational technology among teachers in public elementary and secondary schools during 2008-2009. Data resulted from a national teacher-level survey focused on educational technology. The Office of Educational Technology (OET) in the U.S. Department of Education asked the NCES to assist in a survey to identify access to information technology in schools and classrooms. NCES used its Fast Response Survey System (FRSS) to conduct these surveys. The surveys collected data on "availability and use for a range of educational technology resources, such as district and school networks, computers, devices that enhance the capabilities of computers for instruction, and computer software" (Gray et al., 2010). A total of 2,005 public schools in 50 states and the District of Columbia provided sampling lists. From these lists, questionnaires were mailed to 4,133 teachers selected from these sampling lists.

Key findings from the latter study include 97% of teachers having access to one or more computer (s) within the classroom and 93% of computers in classrooms had access to Internet (Gray et al., 2010). Other key findings from the NCES study include the reporting of students using computers in the classroom during instructional time "often" at 40% and 29% at "sometimes" (Gray et al., 2010). This study is significant for that it provides national data on schools and technology. The surveys in this study were "developed to reflect how information on educational technology is kept within most public school systems" (Gray et al., 2010, p. 1).

PBS LearningMedia

The PBS LearningMedia survey took place January 15-20, 2013, and as conducted with help of VeraQuest. The survey was completed to determine the amount and type of technology available in classrooms as well as a focus on any appearing tendencies, such as tablet or e-reader usage. Another area surveyed was frequency and purpose teachers use technology in their classrooms. Lastly, a focus on perceptions of teachers towards technology in classrooms was identified (PBS LearningMedia, 2013).

Among the many benefits to using technology in the classroom, results from the PBS LearningMedia (2013) survey found the areas of greatest benefit to include reinforcement, enrichment, and motivation (74%), and variation in instruction (73%). Teachers identified using technology for purposes of "online lesson plans (48%), web-based interactive games (45%), and as a delivery vehicle for information . . . (44%)" (PBS LearningMedia, 2013, para.1). The year-over-year assessment on educational technology in the classrooms identifies an increase in access to and usage of tablets and handheld devices (PBS LearningMedia, 2013). Interestingly, the survey identified 68% of teachers coveting more classroom technology (PBS LearningMedia, 2013, para. 2).

Pew Internet Research Study

The Pew Internet Research study provided details on digital technology being used by middle and secondary teachers (Purcell, Heaps, et al., 2013). This survey found that digital tools are used in classrooms and with assignments. According to the results of this survey, "More than four in ten teachers report the use of e-readers (45%) and tablet computers (43%) in their classrooms or to complete assignments" (Purcell, Heaps, et al., 2013, para. 3). This study included data collected in two phases from 2,462 American middle and high school teachers. Phase one was an online and in-person focus group with middle and high school teachers. The in-person focus groups included teachers involved in Advanced Placement and National Writing Project's Summer Institute as well as teachers at a college board school in the northeast United States. Phase two included in-person focus groups with students in Grades 9-12 from the College Board school.

The above survey was important because it showed the types of technologies American middle and high school teachers are using. The study also showed how some of the teachers are using different technologies. The goal of this study was to gather evidence from the perspectives of students and teachers on different technologies and how these technologies are affecting research and writing in schools (Purcell, Heaps, et al., 2013).

Implications of Learning Theories for Effective Technology Integration

Another relevant study Koc (2005) provides insight on influences of technology integration into pre-service teacher programs such as professional development or new teacher programs. Technology has been documented as allowing teachers to better diversify instruction. Teachers can use technology as a tool to reach students with different backgrounds (Sianjina, 2000).

The study was significant because there is a need to assess how teachers are keeping up with 21st century students and the skills students need to become competitive in the global arena. Technology in schools allows for students to develop needed skills. Education is ever evolving and change seems to be an idea that coincides with education. In order to continue to meet the needs of the 21st century students, teachers need to effectively use technology as a tool to enhance instruction, presentation, learning and students' needs (Fulton, 1997; Sheingold, 1990).

A Study of Teacher Perceptions of Instructional Technology Integration in the Classroom

Yet another study of significance was by Gorder (2008). This particular study focused on how and why teachers integrate technology into classrooms. According to this study, a factor for effective integration is "the teachers' ability to integrate instructional technology activities to meet students' needs" (Gorder, 2008, p. 63). This study examines how teachers were using technology integration in classrooms. Comparisons were made "based on gender, age, number of years in the teaching field, grade level taught, content area, and education level" (Gorder, 2008, p. 63). Understanding how the role of teacher competence and ability can influence how or why a teacher uses a type of technology or does not use technology is important for teaching and learning with a tool called technology (Sheingold, 1990).

Findings from the latter study suggest teachers using technology "regularly are more likely to integrate technology in the classroom" (Gorder, 2008, p. 63). According to the results, teachers were using technology for professional productivity and delivery of instruction but not to integrate technology into teaching and learning. The results also noted minute difference in perceptions of integration based on demographic characteristics. Although the only significant difference identified was based on grade level, "teachers in Grades 9-12 tend to integrate and use technology more than teachers in Grades K-5 or Grades 6-8" (Gorder, 2008, p. 73).

Summary

Evidence confirms the growth of technology usage in just a few years has been swift, "near meteoric" (LearnPad*,* 2013, p. 6). It is also lucid schools are slowly turning to increased technology usage, and teachers desiring increased technology in classroom (PBS LearningMedia, 2013). Tablets, e-readers and like devices are considered "the new digital bookcase" (Elliott, 2013, para. 2), and according to Pew Research Center's Internet and American Life Project more than 40% of teachers and/or students are using a tablet device in their advanced placement and/or national writing project classrooms (Elliott, 2013).

From the review of literature, an understanding of the need to reach learners of the digital age in classrooms has emerged (Prensky, 2001). Educators are finding new innovative techniques and ways to reach digital natives through various technology instructions. The latest studies on technology in schools presents a vision where classrooms using technology can customize instruction, access research at any time, learn by doing, and diversify the knowledge presented (Collins & Halverson, 2009). Technology could revolutionize how teachers and students interact in classrooms as well as how instruction occurs (LearnPad*,* 2013). Although most research supports technology usage in classrooms, the mantra *tread lightly* should continue to be on the minds of all educators as they customize a comprehensive plan for "the rise of the tablets" (Elliott, 2013, p. 1) or new technology in school facilities.

CHAPTER 3

METHODOLOGY

From traditional classrooms to progressive classrooms, technology in schools has migrated its way from stand-alone desktop computers to BYOD (bring your own device). Traditional use of ink-and-paper textbooks is being exchanged for iPads, allowing book bag carrying to be less weighty (Elliott, 2013). Although the evolution of technology in schools has been slow, even rare by some standards (Bacon, 2013), the occasion for teachers as well as students to use technology as a learning and/or teaching tool in classrooms exists (Elliott, 2013).

Even though technology in schools is a relatively new concept, seeing "the advent of microcomputers in the 1908s" (Jonassen, et al., 2010, para. 2), the ever-changing aspect of technology causes schools difficulty when resources need to be replenished, updated, or modified. Due to the latter, it was imperative to understand high school teachers' perspective of usage, access, and effectiveness of technology in schools.

Chapter 3 discusses research methodology including the null hypotheses, data sources, population of the study, data collection process, and instrument used. The purpose of this quantitative study was to examine teachers' perceptions of technology in high schools. According to Always Prepped (2012), "highly effective teachers who use technology always have a reason for using new technology tools. Whether it saves them time, improves learning outcomes, or helps with lesson planning" (para. 2). This study helps determine access teachers have to technology, how teachers are using technology, frequency of said technology, and effectiveness of technology. A survey was conducted to understand high school teachers' perceptions of technology in the state of Indiana. Overall, the design involved the following procedures; more detail is presented later in the chapter:

- The population to be surveyed encompassed teachers in high schools with a grade combination of 9-12 from the state of Indiana.
- Approximately 459 hundred Indiana public high schools were included in the survey population (Public Records, 2014). This included all public high schools in the state of Indiana.
- Data from teachers' perceptions of technology in the classroom were collected from each respondent by means of a *Qualtrics* survey.
- Survey data collected calculated descriptive and inferential analysis.
- Results indicated type of technology usage, frequency of technology usage, method or practice of technology usage, and perceptions of effectiveness of technology.
- Also included in the study were demographic questions.

Research Questions

This quantitative study sought to answer seven questions:

1. What are current technology usage patterns within schools in the state of Indiana?
2. Is there a relationship between frequency of technology equipment usage and perceived effectiveness?
3. Is there a relationship between technology software utilization and perceived effectiveness?

4. Are there significant differences in teachers' perceptions and usage of technology based on age?
5. Are there significant differences in teachers' perceptions and usage of technology based on school enrollment size?
6. Are there significant differences in teachers' perceptions and usage of technology based on teaching position?
7. Do demographic factors predict a significant amount of variance in the teacher technology effectiveness score?

The first question was answered through descriptive analysis. Questions 2 and 3 were answered using Pearson correlation. Questions 4 through 6 were answered using one-way ANOVAs. Question 7 was answered using a multiple regression. Null hypotheses were formulated and tested for each Research Question numbered 2 through 7.

Null Hypothesis

Question 1 was addressed through descriptive analysis.

$H_0$1. There is no relationship between frequency of technology equipment usage and perceived effectiveness.

$H_0$2. There is no relationship between technology software utilization and perceived effectiveness.

$H_0$3. There are no significant differences in teachers' perceptions and usage of technology based on age.

$H_0$4. There are no significant differences in teachers' perceptions and usage of technology based on school enrollment size.

$H_0 5$. There are no significant differences in teachers' perceptions and usage of technology based on teaching position.

$H_0 6$. There is no significant amount of variance in teacher technology effectiveness score based on demographic factors.

Design

Quantitative designs commonly use surveys or instruments that tend to be experimental. Data tools help accumulate information particular to topic and quantitative, providing the what, where, and when of a phenomena. Qualitative designs offer the potential for more bias and connectivity to subjects involved in study (Creswell, 2003). Using quantitative design allows the researcher to maintain independence from subjects participating in study. Subjects maintain anonymity, allowing the researcher's reality to remain objective and focused (Neill, 2007). In qualitative design, potential prejudice comes into play due to researcher's interaction with tested subjects, creating a why and how reality from the perspective of subjects in the study (Neill, 2007).

Through the use of a survey created on the *Qualtrics* website, data collected determined high school teachers' type of technology usage, frequency of technology usage, access and perceptions of technology effectiveness. There was no direct interaction among individuals participating in study.

Participants

For the purpose of this study, the general population consisted of teachers from the state of Indiana in public high school. In the state of Indiana, there were approximately 459 public high schools (Public Records, 2014). High school teachers in a public school facility were included in the survey. This study surveyed public high school teachers whose school addresses were obtained from the Indiana Department of Education (IDOE; n.d.). An email was sent to every teacher listed in the school's alphabetical listing, asking for participation in the survey for the study.

Recruitment and Location of Survey

All research was conducted through Qualtrics, an online survey. The link for the survey (Appendix A) was attached to an email, and the participants accessed the online survey through a link if they chose to participate in the survey. A listing of public high schools was obtained from the IDOE database. An email containing a link to the online survey was sent to every teacher's email found on the school webpage. Teachers were asked to participate in the study to help assemble data on perceptions of technology, access, and usage in schools. The survey was conducted in early fall of 2014. An email (Appendix B) linking to the Qualtrics website was sent to all the teachers selected to participate in this study. The letter explained the purpose of the study and contained directions on how to access the survey via the Qualtrics website. The letter furthered explain how the respondent's identity would be kept nearly anonymous in that no attempt was made to link the surveys to respondents. As well, at any time, the teacher could simply opt out of the survey if he or she chose to do so. A follow-up email was sent approximately one week after the original email to encourage more participants to respond to the survey.

Instruments, Research Materials, and Records

The survey instrument was developed with a purpose to gather data for this study (Appendix A). School email addresses and/or webpages were collected from the IDOE or Indiana Public School Directory (EducationBug, 2014; IDOE, n.d.). From the school webpages, email addresses for teachers were located. In the state of Indiana, every teacher on the high school's alphabetical listing received an email requesting participation in this study. The email entailed a cover letter explaining the research project, directions, and a link to the Qualtrics survey (Appendix C). Each respondent was asked to respond one time to the survey, which took approximately 10 minutes from start to finish.

Procedures

Any of the 459 high schools in the state of Indiana made up the population for the study (Public Records, 2014). A list of high schools was accessed through the IDOE's listing of high schools in the State of Indiana (EducationBug, 2014; IDOE, n.d.). From the listing, high school email addresses were obtained, providing addresses for high school teachers. Every teacher in the alphabetical listing received an email requesting participation in the study. An email link to the survey was included for teachers. Once the participants activated the link to the survey, they were taken to the letter of consent to participate in the study. If the participant chose not to participate at any point in the process, he or she could close out the survey.

High school teachers were surveyed on type of technology access and to what extent technology was available, including emerging uses or trends in technology. Teachers also indicated in the survey technology usage, frequency and purpose of technology in classrooms. As well, teachers identified attitudes concerning technology. Last, the data were used to determine if there were differences in perception of technology based on years teaching, teaching position or school enrollment size. Also addressed was whether there are correlations among usage of technology and effectiveness and access and effectiveness. Demographic variables were used for descriptive purposes in Chapter 4.

Roughly one week following the initial email inviting participants to take part in the survey, a follow up email was sent to thank the participants for completing the survey and encouraging others to complete the survey (Appendix D). Within two to three weeks of the initial email, the survey was taken down, and the data were put into an excel spreadsheet.

Survey

The survey entitled Teachers' Perceptions of Technology Effectiveness in High Schools was used with high school teachers to determine their perceptions of technology access, usage, and effectiveness in classrooms (Appendix A). I created the survey using different ideas and questions that arose during research. Also, this study focused on high school teachers' perceptions of technology, not including elementary, middle or junior high schools.

Content Validity

Validity of the survey was tested by means of research and impartial review. Creswell (2003) suggested several ways to ascertain validity. Face validity determines if the instrument appeared to measure what the instrument was designed to measure. Content validity is the capability to measure the content that it was intended to accomplish (Creswell, 2003). Face validity and content validity were established for this study by using faculty members at Highland Hills Middle School as well as members of the Indiana State University 2013-2014 doctoral cohort. These individuals who perused the survey entitled Teachers' Perceptions of Technology Effectiveness in High Schools were not randomly selected to participate in this study. These focus groups reviewed the questions from the survey, Teachers' Perceptions of Technology Effectiveness in High Schools, and answered the questions. The former individuals were asked to provide reaction to clarity, logic, and content of the survey. Adjustments then were made to the original survey based on the comments from the focus groups (10 middle school teachers and 10 members of the Indiana State University cohort).

Statistical Analysis

The study on access, usage, and perceptions of technology among high school teachers relied on statistical analysis using a survey instrument (Appendix A) that I developed. The survey was administered during the summer of 2014.

Research Question 1 was tested by descriptive analysis. Means and standard deviations were determined for current technology usage patterns within schools in the state of Indiana.

Research Question 2 was tested by inferential analysis. A Pearson correlation test was used to determine if there is a relationship between frequency of technology equipment usage (x axis) and perceived effectiveness (y axis) per high school teachers in the state of Indiana.

Research Question 3 was tested by inferential analysis. A Pearson correlation test was used to determine if there is a relationship between technology software utilization (x axis) and perceived effectiveness (y axis) among high school teachers in the state of Indiana.

Research Question 4 was tested by inferential analysis. A one-way ANOVA measured the significant differences in perceptions and usage of technology based on age. Table 1 reflects age groups for study. This question determined if there are significant differences in perceptions (dependent variable) and usage of technology based on age (independent variable).

Research Question 5 was tested by inferential analysis. A one-way ANOVA measured the significant differences in perceptions and usage of technology based on school enrollment size. For the purpose of this research question, enrollment size was separated into three groups. The groups are depicted in Table 1. This question determined if there were significant differences in perceptions (dependent variable) and usage of technology based on school enrollment (independent variable).

Research Question 6 was tested by inferential analysis. A one-way ANOVA measured the significant differences in perceptions and usage of technology based on teaching position. Table 1 shows the teaching position groups. This question sought to answer whether there were significant differences in perceptions (dependent variable) and usage of technology based on teaching position (independent variable).

Table 1

Study Demographics

Variable	Values	Teaching Position
Age	29 and under	English/language arts
	30 to 40	Fine arts/music
	41 to 50	Math/computer science
	51 or over	Science
Enrollment	400 and under	Social studies/social sciences
	400 to 800	Special education
		Other

Research Question 7 was tested by multiple regression. A multiple regression was used to determine if a relationship existed between the variables: usage of technology and perceived effectiveness of technology. A multiple regression was used to discover the significance of predictor variables (gender, age, and school enrollment) in contributing to the criterion variable (teaching equipment effectiveness composite score, teacher software effectiveness composite score, and student software effectiveness composite score). A multiple regression was used to discover the significance of predictor variables in contributing to the dependent variable, and according to Field (2009), "Regression Analysis enables us to predict future outcomes based on the predictor variables" (p. 198). Data for the dependent variable and the predictor variable were compiled and entered into the Statistical Package for Social Sciences (SPSS) software program; thereafter, proper procedures for multiple regression followed. One preliminary analyses was conducted, examining descriptive statistics of the continuous variables. Normality assumption was checked through examination of histograms for continuous variables. Next, the linearity assumption was checked through examining correlations between continuous variables and scatter diagrams of the dependent variable versus independent variables. Then, multiple linear regression analysis was conducted, including an examination of collinearity as well variance assumptions. Last, the final regression equation was written and interpreted (Field, 2009).

Summary

In this chapter, the design components of the hypotheses, the data information including population, and instrument that will be used were presented and outlined. The purpose of this quantitative study will be to examine Indiana high school teachers' perception of technology, including specifics on access, usage and effectiveness of technology in classrooms. Chapter 4 will examine the results from data collected by means of a Qualtrics survey, including a descriptive and inferential analysis of access teachers to technology, frequency of technology usage, purpose of technology usage, and perceptions of technology effectiveness in classrooms. Chapter 5 will cover results that qualify the impact of the study as well as any indications for future studies.

CHAPTER 4

ANALYSIS OF DATA

The purpose of this quantitative study was to determine high school teachers' perceptions of technology effectiveness. Data from the survey entitled Teachers' Perceptions of Technology Effectiveness in High Schools was used among high school teachers in the state of Indiana to determine high school teachers' perceptions of technology access, usage, and effectiveness in classrooms. According to PBS LearningMedia (2013), there is a minute amount of negative feelings teachers have toward educational technology, and that technology has allowed teachers to do more than any other time. Furthermore, the "accidental revolution concerning the invention of technology has led to the axiom that "invention is the mother of necessity" (Molnar, 1997, para. 1). In order to understand the latter statements and effects of technology in schools, it was important to understand technology accessibility, usage, and perceptibility.

This study used survey methodology to gather data from high school teachers working in the state of Indiana. Teachers were asked what their perceptions were of technology access, usage, and effectiveness in schools. In addition, teachers were asked demographic information, such as gender, age, school enrollment size, and teaching position.

The Teachers' Perceptions of Technology Effectiveness in High Schools consisted of 12 questions and was organized into four parts. Part I asked respondents to identify the type of access to technology, frequency of usage for said technology, and perceived effectiveness of said technology. Part II asked respondents to identify technology software usage and perceived effectiveness of said technology software. Part III asked respondents to identify student access and usage to said technology. As well, respondents were asked to identify perceived student access effectiveness of said technology. Part IV asked respondents to identify gender, age, student enrollment of their school, and current teaching position.

The sampling protocol was followed as described in Chapter 3. Emails were sent to approximately 1,500 high school teachers, Grades 9 through 12, in the state of Indiana. The emails of public school teachers and building administrators were accessed through the IDOE's listing of high schools in the state of Indiana (EducationBug, 2014; IDOE, n.d.). From the listing, high school email addresses was be obtained, providing addresses for high school teachers. An email link to the survey was included for teachers.

This chapter provides a description of the data and presents the results of the study. It is organized into the following sections: descriptive data, findings and analysis of the hypotheses, and summary of findings.

Descriptive Analysis

The research focus of this study was Indiana high school teachers in Grades 9 through 12. A survey was sent to approximately 1,500 high school teachers. The analysis data set contained 343 respondents (response rate 22.9%).

The seven research questions that guided this quantitative study were

1. What are current technology usage patterns within schools in the state of Indiana?
2. Is there a relationship between frequency of technology equipment usage and perceived technology equipment effectiveness?

3. Is there a relationship between technology software utilization and perceived effectiveness?
4. Are there significant differences in teachers' perceptions and usage of technology based on age?
5. Are there significant differences in teachers' perceptions and usage of technology based on school enrollment size?
6. Are there significant differences in teachers' perceptions and usage of technology based on teaching position?
7. Do demographic factors predict a significant amount of variance in teacher technology effectiveness score?

Demographic Data for Whole Sample/Descriptive Data

The population of high school teachers that participated in this survey represented 459 of Indiana high schools. A total of 1,500 emails with a link to the Qualtrics' survey was sent out to various teachers. From the IDOE's listing, high school email addresses were obtained, providing addresses for high school teachers. Approximately 512 teachers responded to the survey but only 343 surveys were usable. A major reason for the unused surveys was due to respondents not completing all questions. Another possible reason for some of the unused surveys was due to a quick glance at the questions and respondents exiting out of Qualtrics. As represented below, the total number of responses for each respondent characteristic is identified. Demographic data were entered into SPSS software and data were collected to report the whole sample's gender, age, school's student enrollment number, and teaching position.

Of 343 respondents who participated in survey, there were 129 men (37.6%) and 214 (62.4%) women. Ages ranged from 29 and under to 51 and older. For the age group 29 and under, there were 30 (8.7%); 72 (21.0%) were in the age range 30 to 40, 106 (30.9%) were in the age range 41 to 50, and 135 (39.4%) were in the age range 51 and older.

Respondents were asked to identify their schools' student enrollment numbers. For the 343 respondents that participated in the study, 38 (11.1%) identified their school enrollment number to be 400 and under. There were 88 (25.7%) respondents in the school enrollment range of 401 to 800. Last, 217 (63.3%) respondents identified their school enrollment number within the range of 801 or more.

Participants involved in the study were asked to select the best descriptor for their current teaching position. Of 343 respondents who participated in the study, 67 (19.5%) were English/language arts, 22 (6.4%) fine arts/music, 40 (11.7%) mathematics/computer science, 68 (19.8%) science, 43 (12.5%) social studies/social sciences, 21 (6.1%) special education, and 82 (23.9%) were in the category of other.

Research Question 1

The first research question was answered using descriptive analysis. Research Question 1 examined high school teachers' current technology usage patterns within the state of Indiana. First, respondents were asked about type of access to technology. Second, descriptive data for access to technology were analyzed. Third, respondents were asked to identify frequency for said technology utilization. Fourth, descriptive data for teacher software utilization were analyzed and reported. Last, student technology utilization descriptive data were reported and analyzed. Descriptive data for respondents' perceived effectiveness of said technologies were analyzed and reported for teacher technology effectiveness, teacher software effectiveness, and student technology effectiveness.

Whole Sample Population/Frequencies for Access to Technology

Survey question 1 asked respondents involved in the study questions regarding technology usage patterns within their schools. First, participants were asked about type of technology access available in their classroom, with 11 types of technology access presented. The types of technology included stand-alone computer, computer on cart or cart checkout, computer lab access, tablet or like device, interactive smart boards, LCD or DLP projectors, Smart phone or iPhone, MP3 player or iPod, digital camera or document camera, or no computer access.

Of the 343 respondents, 258 (75.2%) reported having access to a stand-alone computer and 85 (24.8%) reported no access. A total of 216 (63.0%) respondents had access to a laptop computer in classroom, with 127 (37.0%) who reported no access. Out of 343 participants, 85 (24.8%) reported access to computer on cart or computer cart checkout, and 258 (75.2%) reported no access. There were 202 (58.9%) participants out of 343 who reported access to computer lab, and 141 (41.1%) reported no access. A total of 206 (60.1%) reported access to a Tablet or like device (e.g. Chromebook, e-reader, or iPad), and 137 (39.9%) respondents reported no access. For the 343 respondents, 157 (45.8%) reported access to interactive smart boards, and 186 (54.2%) reported no access. Of the 343 participants, 259 (75.5%) reported access to LCD or DLP projectors, and 84 (24.5%) report no access. Out of 343, there were 106 (30.9%) who had access to a Smart phone or an iPhone, and 237 (69.1%) had no access. Of 343 participants, there were 49 (14.3%) who reported having access to a MP3 player or iPod, and 294 (85.7%) did not have access. A total of 170 (49.6%) reported access to a digital camera or document camera, and 173 (50.4%) reported no access. Last, out of 343 respondents, one reported (.3%) no computer access, and 342 (99.7%) had computer access. In Table 2, the frequency data for the whole sample are listed in response to question one on the survey, which was the type of technology available in the classroom.

Table 2

Frequency Data Access to Technology Whole Population

Type of Technology	*N*	Percent
Stand alone computer	58	75.2%
Laptop computer	216	63.0%
Computer on cart or computer cart checkout	85	24.8%
Computer lab	202	58.9%
Tablet or device of the like (e.g. Chromebook, e-reader, or i-Pad)	206	60.1%
Interactive smart boards	157	45.8%
LCD or DLP projectors	259	75.5%
Smart phone or iPhone	106	30.9%
MP3 player or iPod	49	14.3%
Digital camera or document camera	170	49.6%
No computer access	1	.3%

Whole Sample Population/Frequency for Technology Utilization

Survey questions two and three asked respondents about technology utilization and effectiveness. Participants involved in the study were asked to indicate frequency of utilization for technology equipment in the classroom. Respondents were asked to indicate frequency of use for the following technologies: stand alone computer, laptop computer, computer on cart or computer checkout, computer lab, tablet or like device (e.g. Chromebook, e-reader, or iPad), interactive smart boards, LCD or DLP projectors, Smartphone or iPhone, MP3 player or iPod, digital and document camera. For each of the latter technologies, respondents were permitted to identify frequency of technology based on the following descriptors: never, ranging from once or twice per semester, to two to three times per month, to daily usage. The scores of the teacher technology usage questions were added together for each of the respondents to create a technology usage composite score. The average teacher technology utilization composite score was $M = 29.92$, $SD = 9.71$.

Table 3 provides data for survey question results' on how often said technology is utilized in the classroom.

Table 3

Frequency Data For Teacher Technology Utilization Whole Population

Type of Technology	Never	Once or twice per semester to 2-3 times per month	Daily use
Stand alone computer	21.9%	14.8%	68.5%
Laptop computer	30.7%	22.5%	46.9%
Computer on cart or computer cart checkout	74.1%	23.0%	2.9%
Computer lab	32.4%	57.8%	9.9%
Tablet or device of the like (e.g. Chromebook, e-reader, or i-Pad)	40.8%	30.6%	28.6%
Interactive smart boards	53.6%	13.4%	32.9%
LCD or DLP projectors	21.0%	24.3%	54.8%
Smart phone or iPhone	63.6%	19.5%	16.9%
MP3 player or iPod	82.8%	13.7%	3.5%
Digital camera or document camera	48.1%	43.5%	8.5%

Whole Sample Population/Frequency for Technology Effectiveness

The 343 respondents were asked to indicate how effective they perceived each of the said technologies is for professional usage in the classroom. Respondents were asked to rate perceived effectiveness for each of the following technologies: stand alone computer, laptop computer, computer on cart or computer checkout, computer lab, tablet or like device (e.g. Chromebook, e-reader, or iPad), interactive smart boards, LCD or DLP projectors, Smartphone or iPhone, MP3 player or iPod, and digital camera. Effectiveness for each type of technology listed ranged from ineffective 0-1, somewhat effective 2-3, effective 4-5, to exceptionally effective 6-7. The top two responses in each category are reported. The scores of teacher technology effectiveness questions were added together for each of the respondents, creating a technology effectiveness composite score. The average teacher technology effectiveness composite score was $M = 34.52$, $SD = 11.71$.

For the 343 respondents who rated effectiveness of the stand-alone computer, 107 respondents (31.2%) rated this technology usage a 7 or exceptionally effective. The second most common response had 63 respondents (18.4%) who rated the effectiveness level a 6 or exceptionally effective.

Among the 343 respondents who rated effectiveness of the laptop computer, 106 respondents (30.9%) rated this technology usage a 7 or exceptionally effective. The second most common response had 79 respondents (23.0%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of computer on cart or computer checkout, 130 respondents (37.9%) rated this technology usage a 0 or ineffective. The second most common response had 49 respondents (14.3%) who rated the effectiveness level a 3 or somewhat effective.

Of the 343 respondents who rated effectiveness of computer lab, 57 respondents (16.6%) rated this technology usage a 0 or ineffective. The second most common response had 55 respondents (16.0%) who rated the effectiveness level a 4 or 5, effective range.

There were 69 respondents (20.1%) who rated the effectiveness of the tablet or device of the like, such as Chromebook or e-reader, or iPad, at a level 7 or exceptionally effective. The second most common response had 59 respondents (17.2%) who rated this technology usage a 0 or ineffective.

Of the 343 respondents who rated effectiveness of interactive smart boards, 100 respondents (29.2%) rated this technology usage a 7 or exceptionally effective. The second most common response had 88 respondents (25.7%) who rated the effectiveness level a 0 or ineffective.

A total of 150 respondents (43.7%) rated the usage effectiveness of LCD or DLP projectors as a 7 or exceptionally effective. The second most common response had 78 respondents (22.7%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of Smartphone or iPhone, 124 respondents (36.2%) rated this technology usage a 0 or ineffective. The second most common response had 43 respondents (12.5%) who rated the effectiveness level a 3 or somewhat effective.

Of the 343 respondents who rated effectiveness of MP3 player or iPod, 152 respondents (44.3%) rated this technology usage a 0 or ineffective. The second most common response had 44 respondents (12.8%) who rated the effectiveness level a 2 or somewhat effective.

Eighty-three respondents (24.2%) rated the usage effectiveness of a digital camera or document camera player technology as a 0 or ineffective. The second most common responses were 51 respondents (14.9%) who rated the effectiveness levels a 4 or a 6, effective and exceptionally effective, respectively.

Whole Sample Population/Frequency for Teacher Software Usage

Survey questions four and five asked respondents questions regarding software usage and effectiveness. Frequency data were analyzed for the whole sample in response to how frequently respondents used software for classroom preparation, lessons, instruction, or administrative tasks. The respondents were asked to rate the frequency of usage for different software types including word processing, database management software, spreadsheets and graphic programs, student management software, desktop publishing, plagiarism software, PowerPoint software, quiz making software, simulation software, tutorial software, subject-specific software, Internet, discussion software, and social networking sites. For each of the software types, respondents were permitted to identify frequency of said software based on the following descriptors: never, ranging from once or twice per semester to 2-3 times per month, to daily usage. The scores of teacher software usage questions were added together for each of the respondents, creating a teacher software usage composite score. The average teacher software usage composite score was $M = 58.38$, $SD = 14.71$. Table 4 contains frequency data for the whole sample in response to how frequently respondents use software in the classroom.

Table 4

Frequency Data for Teacher Software Utilization Whole Population

Type of Software	Never	Once or twice per semester to 2-3 times per month	Daily use
Word processing	2.3%	26.8%	70.8%
Database management software	41.4%	35.3%	23.3%
Spreadsheets and graphing software	9.2%	77.6%	14.3%
Software for managing student records	2.4%	8.2%	89.5%
Software for desktop publishing	29.8%	54.8%	15.5%
Software for graphics or image-editing	37.3%	58.1%	4.7%
Software for plagiarism check	64.5%	34.1%	1.5%
Software for making presentations	6.2%	65.1%	28.9%
Software for administering tests	26.2%	68.2%	5.5%
Simulation and visualization programs	40.8%	53.8%	5.5%
Drill and skill, practice programs or tutorials	31.5%	62.8%	5.8%
Internet	.6%	29.2%	70.3%
Blogs or wikis	53.9%	43.8%	2.3%
Social networking websites	54.2%	37.9%	7.9%

Whole Sample Population/Frequency for Technology Software Effectiveness

The 343 respondents were asked to indicate how effective they perceived each of the said technology software was for professional usage in the classroom, including preparation, lessons, instruction, or administrative tasks. Respondents were asked to rate perceived effectiveness for each of the following software types: word processing, database management software, spreadsheets and graphic programs, image-editing software, plagiarism software, PowerPoint software, quiz making software, simulation software, tutorial software, subject-specific software, Internet, discussion software, and social networking sites. Effectiveness for each type of software listed ranged from ineffective 0-1, somewhat effective 2-3, effective 4-5, to exceptionally effective 6-7. The top two responses in each category were reported. Frequency data for perceived technology software effectiveness were listed. The scores of teacher technology software effectiveness questions were added together for each of the respondents, creating a perceived teacher technology software effectiveness composite score. The average teacher technology software effectiveness composite score was M = 63.80, SD = 16.86.

Of the 343 respondents rating effectiveness of word processing, 180 respondents (52.5%) rated this technology software a 7 or exceptionally effective. The second most common response had 91 respondents (26.5%) who rated the effectiveness level a 6 or exceptionally effective.

Among the 343 respondents rating effectiveness of database management software, 76 respondents (22.2%) rated this technology software a 0 or ineffective. The second most common responses had 51 respondents (14.9%) who rated the effectiveness level a 5 and 7, effective and exceptionally effective respectively.

Of the 343 respondents who rated effectiveness of spreadsheets and graphing programs (e.g., Excel), 75 respondents (21.9%) rated this technology software a 7 or exceptionally effective. The second most common response had 73 respondents (21.3%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of software for managing student records, 195 respondents (56.9%) rated this technology software a 7 or exceptionally effective. The second most common response had 68 respondents (19.8%) who rated the effectiveness level a 6 or exceptionally effective.

Among the 343 respondents rating effectiveness of software for desktop publishing, 60 respondents (17.5%) rated this technology software a 5 or effective. The second most common responses had 56 respondents (16.3%) who rated the effectiveness levels a 4 and 0, effective or ineffective respectively.

Of the 343 respondents who rated effectiveness of software for graphics or image-editing software, 67 respondents (19.5%) rated this technology software a 4 or effective. The second most common response had 59 respondents (17.2%) who rated the effectiveness level a 0 or ineffective.

For the 343 respondents who rated effectiveness of software for plagiarism check, 91 respondents (26.5%) rated this technology software a 0 or ineffective. The second most common response had 48 respondents (14.0%) who rated the effectiveness level a 5 or effective.

Of the 343 respondents who rated effectiveness of software for making presentations (e.g., PowerPoint, Prezi, Keynote), 122 respondents (35.6%) rated this technology software a 7 or exceptionally effective. The second most common response had 107 respondents (31.2%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of software for administering tests (e.g., Quia, Quizlet), 74 respondents (21.6%) rated this technology software a 7 or exceptionally effective. The second most common response had 67 respondents (19.5%) who rated the effectiveness level a 6 or exceptionally effective.

For the 343 respondents who rated effectiveness of software for simulation and visualization programs, 72 respondents (21.0%) rated this technology software a 0 or ineffective. The second most common response had 54 respondents (15.7%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of software for drill and skill, practice programs, or tutorials, 66 respondents (19.2%) rated this technology software a 4 or effective. The second most common response had 51 respondents (14.9%) who rated the effectiveness level a 5 or effective.

Among the 343 respondents who rated effectiveness of the Internet, 181 respondents (52.8%) rated this technology software a 7 or exceptionally effective. The second most common response had 70 respondents (20.4%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of software for blogs or wikis, 118 respondents (34.4%) rated this technology software a 0 or ineffective. The second most common response had 53 respondents (15.5%) who rated the effectiveness level a 4 or effective.

For the 343 respondents who rated effectiveness of software for social networking websites, 124 respondents (36.2%) rated this technology software a 0 or ineffective. The second most common response had 46 respondents (13.4%) who rated the effectiveness level a 4 or effective.

Whole Sample Population/Frequency for Student Technology Usage

Survey questions six and seven asked respondents how students were using technology in the classroom, and how respondents' perceived effectiveness of said technologies. Frequency data were analyzed for the whole sample in response to how frequently students utilized software for activities in the classroom. The respondents were asked to rate the frequency of usage for 15 different software types, including written text (e.g., word processing, desktop publishing, editing software), graphics or visual displays (e.g., graphs, diagrams, pictures, maps), learn or practice content skills, research (e.g., Internet searches, reference materials, library searches), communication (e.g., teachers, students, experts) via email, network, or Internet, blog or wiki discussion, social networking websites, problem solving or data analysis, multimedia presentations, art, music, movies, or webcasts, demonstrations, models, or simulations, product development, online class or online class board for discussion, teacher webpages, and instant messaging. For each of the software types, respondents were permitted to identify frequency of said software based on the following descriptors: never, ranging from once or twice per semester to two to three times per month, to daily usage. The scores of student technology usage questions were added together for each of the respondents, creating a student technology usage composite score. The average student technology usage composite score was $M = 51.02$, $SD = 17.22$. Table 5 contains frequency data for the whole sample in response to student technology utilization in the classroom.

Table 5

Frequency Data For Student Technology Utilization Whole Population

Type of Software	Never	Once or twice per semester to 2-3 times per month	Daily use
Written text	6.4%	72.6%	21.0%
Graphics or visual displays	9.4%	81.4%	9.3%
Learn or practice content skills	9.1%	69.3%	21.6%
Research	5.0%	84.4%	10.8%
Communication via email, network or Internet	4.4%	56.4%	29.2%
Blog or wiki discussion	67.4%	31.5%	1.2%
Social networking websites	63.6%	30.0%	6.4%
Problem solving, data analysis, or calculations	30.6%	62.7%	6.7%
Multimedia presentations	8.8%	85.5%	5.8%
Art, music, movies, or webcasts	23.6%	70.6%	5.8%
Demonstrations, models, or simulations	22.5%	74.2%	3.2%
Product development	67.4%	30.3%	2.3%
Online class, online board or discussion	52.8%	41.5%	5.8%
Course or teacher web page	32.3%	47.2%	20.4%
Instant messaging	61.2%	34.1%	4.7%

Whole Sample Population/Frequency for Student Technology Effectiveness

The 343 respondents were asked to indicate how effective they perceived each of the said technology is for students' learning in the classroom. Respondents were asked to rate perceived effectiveness for each of the following student technology types: written text (e.g., word processing, desktop publishing, editing software), graphics or visual displays (e.g., graphs, diagrams, pictures, maps), learn or practice content skills, research (e.g., Internet searches, reference materials, library searches), communication (e.g., teachers, students, experts) via email, network, or Internet, blog or wiki discussion, social networking websites, problem solving or data analysis, multimedia presentations, art, music, movies, or webcasts, demonstrations, models, or simulations, product development, online class or online class board for discussion, teacher webpages, and instant messaging. Effectiveness for each type of software listed ranged from ineffective 0-1, somewhat effective 2-3, effective 4-5, to exceptionally effective 6-7. The top two responses in each category are reported. Frequency data were analyzed for perceived student technology usage effectiveness. The scores of perceived student technology usage effectiveness questions were added together for each of the respondents, creating a student technology usage effectiveness composite score. The average student technology usage effectiveness composite score was $M = 62.13$, $SD = 18.57$.

Of 343 respondents who rated effectiveness of written text (e.g., word processing, desktop publishing, editing software), 125 respondents (36.4%) rated this technology a 7 or exceptionally effective. The second most common response had 84 respondents (24.5%) who rated the effectiveness level a 6 or exceptionally effective.

Of 343 respondents who rated effectiveness of graphics or visual displays (e.g., graphs, diagrams, pictures, maps), 88 respondents (25.7%) rated this technology a 6 or exceptionally effective. The second most common responses had 83 respondents (24.2%) who rated the effectiveness level a 7 or exceptionally effective.

Among the 343 respondents rating effectiveness of learn or practice content skills, 91 respondents (26.5%) rated this technology a 7 or exceptionally effective. The second most common response had 81 respondents (21.3%) who rated the effectiveness level a 6 or exceptionally effective.

Within the 343 respondents who rated effectiveness of research (e.g., Internet searches, reference materials, library searches), 109 respondents (31.8%) rated this technology a 7 or exceptionally effective. The second most common response had 84 respondents (24.5%) who rated the effectiveness level a 6 or exceptionally effective.

For the 343 respondents who rated effectiveness of communication via email, network, or Internet (e.g., teachers, students, experts), 104 respondents (30.3%) rated this technology a 7 or exceptionally effective. The second most common response had 84 respondents (24.5%) who rated the effectiveness level a 6 or exceptionally effective.

Of the 343 respondents who rated effectiveness of blog or wiki discussion, 117 respondents (34.1%) rated this technology software a 0 or ineffective. The second most common response had 44 respondents (12.8%) who rated the effectiveness level a 4 or effective.

For the 343 respondents who rated effectiveness of social networking websites, 128 respondents (37.3%) rated this technology software a 0 or ineffective. The second most common response had 52 respondents (15.2%) who rated the effectiveness level a 1 or ineffective.

Among the 343 respondents who rated effectiveness of problem solving or data analysis, 66 respondents (19.2%) rated this technology software a 6 or exceptionally effective. The second most common response had 62 respondents (18.1%) who rated the effectiveness level a 5 or effective.

Of 343 respondents who rated effectiveness of multimedia, 98 respondents (28.6%) rated this technology software a 5 or effective. The second most common response had 79 respondents (23.0%) who rated the effectiveness level a 6 or exceptionally effective.

Within the 343 respondents who rated effectiveness of art, music, movies, or webcasts, 75 respondents (21.9%) rated this technology software a 5 or effective. The second most common responses had 56 respondents (16.3%) who rated the effectiveness level a 4 and 6, effective and exceptionally effective respectively.

Of the 343 respondents who rated effectiveness of demonstrations, models, and simulations, 78 respondents (22.7%) rated this technology software a 5 or effective. The second most common response had 73 respondents (21.3%) who rated the effectiveness level a 6 or exceptionally effective.

Among the 343 respondents who rated effectiveness of product development, 113 respondents (32.9%) rated this technology software a 0 or ineffective. The second most common response had 52 respondents (15.2%) who rated the effectiveness level a 4 or effective.

For the 343 respondents who rated effectiveness of online class or online board for discussion, 82 respondents (23.9%) rated this technology software a 0 or ineffective. The second most common response had 62 respondents (18.1%) who rated the effectiveness level a 4 or effective.

Of the 343 respondents who rated effectiveness of course or teacher webpage, 70 respondents (20.4%) rated this technology software a 7 or exceptionally effective. The second most common response had 64 respondents (18.7%) who rated the effectiveness level a 4 or effective.

Within the 343 respondents who rated effectiveness of course or instant messaging (e.g., Remind), 117 respondents (34.1%) rated this technology software a 0 or ineffective. The second most common response had 39 respondents (11.4%) who rated the effectiveness level a 7 or exceptionally effective.

A teacher composite total for all four of the prior sections was added together. This included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total was $M = 186.63$, $SD = 41.71$. Student usage and perceived technology effectiveness composite total was $M = 113.16$, $SD = 31.97$.

Descriptive Data by Age Category (29 and Under)

The descriptive data were analyzed for the age category 29 and under in response to the question, “Are there significant differences in perceptions and usage of technology based on age?” Of the 30 respondents that were in the age range 29 and under, 11 (36.7%) were men, and 19 (63.3%) were women.

Respondents were asked to use the scale provided to identify their school’s student enrollment number. Options for enrollment included 400 and under, 401 to 800, 801 or more. Of the 30 respondents that were 29 and under, six respondents (20.0%) identified their school enrollment to be in the 400 and under category. Eight respondents (26.7%) selected their school enrollment range between 401 and 800, and 16 respondents (53.3%) selected school enrollment in the 801 or more range.

Respondents were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 30 respondents that were 29 and under, six (20.0%) identified English/language arts as their teaching position, one (3.3%) identified fine arts/music as his or her teaching position, seven (23.3%) identified mathematics or computer science as their teaching position, six (20.0%) selected science as their teaching position, three (10.0%) identified social studies and social sciences, two (6.7%) selected special education, and five (16.7%) selected other as their descriptor for their teaching position.

As shown in Table 6, a composite total for respondents 29 and under was added together. The composite total included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents 29 and under was $M = 188.3$, $SD = 34.3$, and the composite total for student usage and perceived technology effectiveness was $M = 113.8$, $SD = 30.1$.

Table 6

Descriptive Data for 29 and Under Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	30.9	9.62
Teacher Technology Effectiveness	36.2	10.90
Teacher Software Usage	56.1	12.60
Teacher Software Effectiveness	65.1	12.70
Student Technology Usage	49.9	17.00
Student Technology Effectiveness	63.8	16.40
Teacher Composite Total	188.3	34.30
Student Composite Total	113.8	30.10

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was M = 186.6, SD = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the age range 29 and under. The overall whole composite score for students was M = 113.2, SD = 32.0. Overall, there were slight increases in means for composite scores in the age category 29 and under.

Descriptive Data by Age Category (30-40)

Descriptive data were analyzed for the age range of 30 to 40 years in response to the question, "Are there significant differences in perceptions and usage of technology based on age?" Of the 72 respondents that were in the age range 30 to 40, 28 (38.9%) were men, and 44 (61.1%) were women.

Respondents were asked to use the scale provided to identify their school's student enrollment number. Options for enrollment included 400 and under, 401 to 800, 801 or more. Of the 72 respondents that were in the age range 30 to 40, eight respondents (11.1%) identified their school enrollment to be in the 400 and under category. Seventeen respondents (23.6%) selected their school enrollment range between 401 and 800, and 47 (65.3%) were in the 801 or more range.

Respondents were asked to use the scale to identify the best descriptor for their current teaching positions. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 72 respondents that were in the age range of 30 to 40 years, 17 respondents (23.6%) identified English/language arts as their teaching position, two respondents (2.8%) identified fine arts/music as their teaching position, seven respondents (9.7%) identified mathematics or computer science as their teaching position, 13 respondents (18.1%) selected science as their teaching position, 14 respondents (19.4%) identified social studies and social sciences, three respondents (4.2%) selected special education, and 16 respondents (22.2%) selected other as their descriptor for their teaching position.

In Table 7, the composite total for respondents in the age range 30 to 40 years was added together. The composite total included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents 30 to 40 years of age was $M = 190.7$, $SD = 39.0$, and the composite total for student usage and perceived technology effectiveness was $M = 116.3$, $SD = 28.4$.

Table 7

Descriptive Data for Age 30-40 Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	30.1	8.1
Teacher Technology Effectiveness	36.2	10.6
Teacher Software Usage	58.4	15.2
Teacher Software Effectiveness	66.0	15.9
Student Technology Usage	50.8	15.4
Student Technology Effectiveness	65.4	16.9
Teacher Composite Total	190.7	39.0
Student Composite Total	116.3	28.4

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score for student technology utilization and effectiveness had a lower mean than respondents in the age range 30 to 40 years. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score or mean was lower than respondents 30 to 40.

Descriptive Data by Age Category (41-50)

The descriptive data were analyzed for the age range 41 to 50 years in response to the question, “Are there significant differences in perceptions and usage of technology based on age?” Of the 106 respondents that were in the age range 41 to 50, 39 (36.8%) were men, and 67 (63.2%) were women.

Respondents were asked to use the scale provided to identify their school's student enrollment number. Options for enrollment included 400 and under, 401 to 800, and 801 or more. Of the 106 respondents that were in the age range 41 to 50, 12 (11.3%) identified their school enrollment to be in the 400 and under category. Twenty-four respondents (22.6%) selected their school enrollment range between 401 and 800, and 70 respondents (66.0%) were in the 801 or more range.

Respondents were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 106 respondents that were in the age range 41 to 50, 17 (16%) identified English/language arts as their teaching position, nine respondents (8.5%) identified fine arts/music as their teaching position, 13 (12.3%) identified mathematics or computer science as their teaching position, 17 (16.0%) selected science as their teaching position, 14 (13.2%) identified social studies and social sciences, two (1.9%) selected special education, and 34 (32.1%) selected other as their descriptor for their teaching positions.

Table 8 shows the composite total for respondents in the age range 41 to 50 was added together. The composite total included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents 41 to 50 years was $M = 193.3$, $SD = 43.9$, and the composite total for student usage and perceived technology effectiveness was $M = 117.2$, $SD = 33.2$.

Table 8

Descriptive Data for Age 41-50 Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	30.9	10.1
Teacher Technology Effectiveness	35.4	11.7
Teacher Software Usage	61.4	14.7
Teacher Software Effectiveness	65.6	17.6
Student Technology Usage	53.4	18.5
Student Technology Effectiveness	63.7	18.5
Teacher Composite Total	193.3	43.9
Student Composite Total	117.2	33.2

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness had a lower mean than respondents in the age range 41 to 50 years. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score had lower mean than respondents 41 to 50 years.

Descriptive Data by Age Category (51 and older)

Descriptive data was analyzed for the age range 51 and older in response to the question, “Are there significant differences in perceptions and usage of technology based on age?” Of the 135 respondents that were in the age range 51 and older, 51 (37.8%) were men, and 84 (62.2%) were women.

Respondents were asked to use the scale provided to identify their school's student enrollment number. Options for enrollment included 400 and under, 401 to 800, 801 or more. Of the 135 respondents that were in the age range 51 and older, 12 (8.9%) identified their school enrollment to be in the 400 and under category. Thirty-nine respondents (28.9%) selected their school enrollment range between 401 and 800, and 84 respondents (62.2%) selected the 801 or more range.

Respondents were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 135 respondents that were in the age range 51 and older, 27 (20%) identified English/language arts as their teaching position, 10 (7.4%) identified fine arts/music as his or her teaching position, 13 (9.6%) identified mathematics or computer science as their teaching position, 32 (23.7%) selected science as their teaching position, 12 (8.9%) identified social studies and social sciences, 14 (10.4%) selected special education, and 27 (20.0%) selected other as their descriptor for their teaching position.

In Table 9, the composite total for respondents in the age range 51 and older was added together. The composite total included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents 51 and older was $M = 178.8$, $SD = 42.1$, and the composite total for student usage and perceived technology effectiveness was $M = 108.2$, $SD = 32.8$.

Table 9

Descriptive Data for Age 51 and Older Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	28.8	10.2
Teacher Technology Effectiveness	32.6	12.3
Teacher Software Usage	56.5	14.6
Teacher Software Effectiveness	61.0	17.3
Student Technology Usage	49.5	17.1
Student Technology Effectiveness	58.7	19.6
Teacher Composite Total	178.8	42.1
Student Composite Total	108.2	32.8

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score mean for student technology utilization and effectiveness was higher than respondents in the age range 51 and older. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score mean was higher than respondents 51 and older.

Descriptive Data by School Enrollment (400 and Under)

The descriptive data were analyzed for school enrollment size of 400 and under in response to the question, “Are there significant differences in perceptions and usage of technology based on school enrollment size?” Of the 38 respondents that were in the school enrollment size of 400 and under, 12 (31.6%) were men, and 26 (68.4%) were women.

Respondents in the school enrollment range of 400 and under were asked to use the scale provided to identify their age. Options for age included 29 and under, 30 to 40, 41 to 50, and 51 and older. Of the 38 respondents that were in the school enrollment size of 400 and under, six (15.8%) identified their age to be in the 29 and under category. Eight respondents (21.1%) selected their age to be between 30 and 40, 12 respondents (31.6%) selected their age range to be between 41 and 50, and 12 respondents (31.6%) were in the 51 or older age range.

Respondents in the school enrollment range of 400 and under were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 38 respondents in the 400 and under school enrollment range, 13 (34.2%) identified English/language arts as their teaching position, one (2.6%) identified fine arts/music as his or her teaching position, two (5.3%) identified mathematics or computer science as their teaching position, seven (18.4%) selected science as their teaching position, one (2.6%) identified social studies and social sciences, two (5.3%) selected special education, and 12 (31.6%) selected other as their descriptor for their teaching positions.

Shown in Table 10 is the composite total for respondents in the school enrollment size of 400 and under was added together. The composite total includes teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents in the school enrollment size of 400 and under was $M = 194.2$, $SD = 45.0$, while the composite total for student usage and perceived technology effectiveness was $M = 116.1$, $SD = 32.8$.

Table 10

Descriptive Data for Enrollment Size 400 and Under Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	31.9	10.6
Teacher Technology Effectiveness	35.7	11.5
Teacher Software Usage	60.0	13.9
Teacher Software Effectiveness	66.6	17.9
Student Technology Usage	50.7	17.4
Student Technology Effectiveness	65.4	19.6
Teacher Composite Total	194.2	45.0
Student Composite Total	116.1	32.8

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score for student technology utilization and effectiveness had a lower mean than respondents in the school enrollment size of 400 and under. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score had a lower mean than respondents in the school enrollment size of 400 and under.

Descriptive Data by School Enrollment (401 to 800)

Descriptive data were analyzed for school enrollment size of 401 to 800 in response to the question, "Are there significant differences in perceptions and usage of technology based on school enrollment size?" Of the 88 respondents that were in the school enrollment size of 401 to 800, 35 (39.8%) were men, and 53 (60.2%) were women.

Respondents in the school enrollment range of 401 to 800 were asked to use the scale provided to identify their age. Options for age included 29 and under, 30 to 40, 41 to 50, and 51 and older. Of the 88 respondents in the school enrollment size of 401 to 800, eight (9.1%) identified their age to be in the 29 and under category. Seventeen respondents (19.3%) selected their age to be between 30 and 40, 24 respondents (27.3 %) selected their age range to be between 41 and 50, and 39 (44.3%) were in the 51 or older age range.

Respondents in the school enrollment range of 401 to 800 were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 88 respondents in the 401 to 800 school enrollment range, 15 (17.0%) identified English/language arts as their teaching position, five (5.7%) identified fine arts/music as their teaching position, 15 (17.0%) identified mathematics or computer science as their teaching position, 11 (12.5%) selected science as their teaching position, 13 (14.8%) identified social studies and social sciences, six (6.8%) selected special education, and 23 (26.1%) selected other as their descriptor for their teaching position.

A composite total for respondents in the school enrollment size of 401 to 800 was added together (Table 11). The composite total includes teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents in the school enrollment size of 401 to 800 was $M = 181.5$, $SD = 39.9$, and the composite total for student usage and perceived technology effectiveness was $M = 115.6$, $SD = 30.4$.

Table 11

Descriptive Data for Enrollment Size 401 to 800 Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	28.5	9.8
Teacher Technology Effectiveness	33.6	11.5
Teacher Software Usage	57.8	16.5
Teacher Software Effectiveness	61.6	15.2
Student Technology Usage	53.8	17.4
Student Technology Effectiveness	61.8	16.7
Teacher Composite Total	181.5	39.9
Student Composite Total	115.6	30.4

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score for student technology utilization and effectiveness had a higher mean than respondents in the school enrollment size of 401 to 800. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score had a lower mean than respondents in the school enrollment size of 401 to 800.

Descriptive Data by School Enrollment (801 or More)

The descriptive data was analyzed for school enrollment size of 801 or more in response to the question, “Are there significant differences in perceptions and usage of technology based on school enrollment size?” Of the 217 respondents that were in the school enrollment size of 801 or more, 82 (37.8%) were men, and 135 (62.2%) were women.

Respondents in the school enrollment range of 801 or more were asked to use the scale provided to identify their age. Options for age included 29 and under, 30 to 40, 41 to 50, or 51 and older. Of the 217 respondents who were in the school enrollment size of 801 or more, 16 (7.4%) identified their age to be in the 29 and under category. Forty-seven respondents (21.7%) selected their age to be between 30 and 40, 70 respondents (32.3 %) selected their age range to be between 41 and 50, and 84 (38.7%) were in the 51 or older age range.

Respondents in the school enrollment range of 801 or more were asked to use the scale to identify the best descriptor for their current teaching position. Options for teaching positions included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. Of the 217 respondents in the 801 or more school enrollment range, 39 (18.0%) identified English/language arts as their teaching position, 16 (7.4%) identified fine arts/music as his or her teaching position, 23 (10.6%) identified mathematics or computer science as their teaching position, 50 (23.0%) selected science as their teaching position, 29 (13.4%) identified social studies and social sciences, 13 (6.0%) selected special education, and 47 (21.7%) selected other as their descriptor for their teaching position.

In Table 12, the composite total for respondents in the school enrollment size of 801 or more was added together. The composite total includes teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents in the school enrollment size of 801 or more was $M = 187.4$, $SD = 41.8$, and the composite total for student usage and perceived technology effectiveness was $M = 111.7$, $SD = 32.5$.

Table 12

Descriptive Data for Enrollment Size 801 or more Composite Score

Composite Score	*M*	*SD*
Teacher Technology Utilization	30.1	9.5
Teacher Technology Effectiveness	34.7	11.9
Teacher Software Usage	58.3	14.1
Teacher Software Effectiveness	64.2	17.3
Student Technology Usage	50.0	17.1
Student Technology Effectiveness	61.7	19.1
Teacher Composite Total	187.4	41.8
Student Composite Total	111.7	32.5

A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score for student technology utilization and effectiveness had a lower mean than respondents in the school enrollment size of 801 or more. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score had a higher mean than respondents in the school enrollment size of 801 or more.

Inferential Test Results

For Research Question 2, a Pearson correlation was conducted to ascertain the strength of association between equipment usage and perceived technology effectiveness. In Research Question 3, a Pearson correlation was conducted to ascertain the strength of association between technology access and perceived effectiveness. For Research Questions 4 through 6, a one-way

ANOVA test was used to measure the significant differences in teachers' perceptions of technology usage and demographic factors, such as age, school enrollment size, and teaching position. The one-way ANOVA test was selected because there was one dependent variable and the independent variables had more than two levels for each of the null hypothesis. For Research Question 4, the independent variable was age. The independent variable had four levels. The levels were 29 and under, 30 to 40, 41 to 50, and 41 to 50. For Research Question 5, the independent variable was school enrollment size. The independent variable had three levels. The levels for school enrollment size were 400 and under, 401 to 800, and 801 or more. For Research Question 6, the independent variable was current teaching position. The independent variable had seven levels. The levels for teaching position included English/language arts, fine arts/music, mathematics/computer science, sciences, special education, and other. The dependent variable for Research Questions 4 through 6 was, what are teachers' perceptions of and usage of technology?

Research Question 2

Research Question 2 was tested by inferential analysis. A Pearson correlation test was used to determine if there was a relationship between two levels—frequency of technology equipment usage (x axis) and perceived effectiveness (y axis) per high school teachers in the state of Indiana. Assumptions for Pearson correlation test were evaluated and analyzed. The two levels of the dependent variable needed to be interval, thus, the assumption was met. Dependent variable (external factors) scores were examined to determine if potential outliers existed in the model. Scatterplots were used to identify any potential outlier within the model. The scatterplot was visually inspected for data that fell outside the normal pattern. No outliers were present so assumption was met. The scatterplot also helped test linearity, concluding linearity was met due to the pattern of an approximating straight line. A Shapiro-Wilk test was used to test for normality, looking to ensure scores for the dependent variable were normally distributed for both groups. Assumption was met due to the significance value (*p*-value) in the Shapiro-Wilk test being greater than .05.

The null hypothesis for Research Question 2 was, "There was no relationship between type of usage and perceived effectiveness." A Pearson correlation using SPSS was used to ascertain whether there was a significant relationship between technology equipment utilization and perceived technology effectiveness. The teacher technology equipment composite score (M = 29.92, SD = 9.71) and the teacher equipment effectiveness score (M = 34.52, SD = 11.72) demonstrated a significant positive relationship between teacher technology equipment utilization and perceived technology effectiveness. This positive relationship was evident with a Pearson correlation value of r = .455, p = < .001. As indicated by the test result, the more frequent the usage of technology equipment the higher perceived effectiveness of technology.

Research Question 3

Research Question 3 was tested by inferential analysis. A Pearson correlation test was used to determine if there was a relationship between technology software utilization (x axis) and perceived effectiveness (y axis) among high school teachers in the state of Indiana. Assumptions for Pearson correlation test were evaluated and analyzed. The two levels of the dependent variable needed to be interval, thus, the assumption was met. Dependent variable (external factors) scores were examined to determine if potential outliers existed in the model. Scatterplots were used to identify any potential outlier within the model. The scatterplot was visually inspected for data that fell outside the normal pattern. No outliers were present so assumption was met. The scatterplot also helped test linearity, concluding linearity was met due to the pattern of an approximating straight line. A Shapiro-Wilk test was used to test for normality, looking to ensure scores for the dependent variable were normally distributed for both groups. Assumption was met due to the significance value (*p*-value) in the Shapiro-Wilk test being greater than .05.

The null hypothesis for Research Question 3 was, “There was no relationship between technology software utilization and perceived effectiveness.” A Pearson correlation using SPSS was used to ascertain whether there was a significant relationship between technology software utilization and perceived software effectiveness. The teacher software utilization composite score (M = 58.38, SD = 14.71) and the teacher software effectiveness score (M = 63.80, SD = 16.86) demonstrated a significant positive relationship between teacher software utilization and perceived software effectiveness. This positive relationship was evident with a Pearson correlation value of r = .642, p = < .001. As indicated by the test result, the more frequent the usage of software the higher perceived effectiveness of technology.

Research Question 4

Research Question 4 was tested by inferential analysis. The hypothesis for this research question was, “There were no significant differences in teachers’ perceptions and usage of technology based on age.” A one-way ANOVA using SPSS was used to test for significant differences and the assumptions were tested to insure the validity of the results. This question determined if there were significant differences in perceptions (dependent variable) and usage of technology based on age (independent variable).

Dependent variable scores were examined to determine if potential outliers existed in the model. Box plots were used to identify any potential outlier within the model. There were no data points on the dependent variable scores among the different groups that fell outside of 1.5

standard deviations from the edge of the box, thus concluding there were no outliers in the model. The assumption of normality was examined using Shapiro-Wilk's test to determine if the scores on the dependent variable were normally distributed for all groups. This assumption was met as the significance value was greater than .05. The assumption of homogeneity of variances was examined using Levene's test of equality of variances to insure that all variances on the dependent variable were equal for all groups. This assumption of homogeneity of variances was not violated because the significance level was greater than .05.

The results of the one-way ANOVA demonstrated significant differences on the teacher composite total score based on age category, $F(3, 339) = 2.77$, $p = .042$, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey HSD post hoc test was used.

After examination of the results of the Tukey HSD post hoc tests, it was determined the 41 to 50 age group ($M = 193.32$, $SD = 43.86$) was significantly higher than the 51 and older age group ($M = 178.83$, $SD = 42.05$), $p = .037$. All other comparisons were non-significant with *p*-values greater than the chosen alpha level of .05.

The results of the one-way ANOVA demonstrated no significant differences on the student composite total score based on age category, $F(3, 339) = 1.88$, $p = .133$, two-tailed. Within the model, no significant differences were demonstrated. The null hypothesis was retained. Any differences among the groups could be contributed to chance. No post hoc tests were necessary.

Research Question 5

Research Question 5 was tested by inferential analysis. The hypothesis for this research question was, "There were no significant differences in teachers' perceptions and usage of technology based on enrollment." A one-way ANOVA using SPSS was used to test for significant differences and the assumptions were tested to insure the validity of the results. This question determined if there were significant differences in perceptions (dependent variable) and usage of technology based on school enrollment size (independent variable).

Dependent variable scores were examined to determine if potential outliers existed in the model. Box plots were used to identify any potential outlier within the model. There were no data points on the dependent variable scores among the different groups that fell outside of 1.5 standard deviations from the edge of the box, thus, concluding there were no outliers in the model. The assumption of normality was examined using Shapiro-Wilk's test to determine if the scores on the dependent variable were normally distributed for all groups. This assumption was met as the significance value was greater than .05. The assumption of homogeneity of variances was examined using Levene's test of equality of variances to insure that all variances on the dependent variable were equal for all groups. This assumption of homogeneity of variances was not violated because the significance level was greater than .05

The results of the one-way ANOVA demonstrated a lack of significant differences on the teacher composite total score based on the category of school enrollment size. The results of the one-way ANOVA demonstrated this lack of significant differences, $F(2, 340) = 1.32$, $p = .268$, two-tailed. The null hypothesis was retained. Any differences among the groups could be contributed to chance. No post hoc tests were necessary.

The results of the one-way ANOVA demonstrated a lack of significant differences on the student composite total score based the category of school enrollment size. The results of the one-way ANOVA demonstrated this lack of significant differences, $F(2, 340) = .648$, $p = .524$, two-tailed. The null hypothesis was retained. Any differences among the groups could be contributed to chance. No post hoc tests were necessary.

Research Question 6

Research Question 6 was tested by inferential analysis. The hypothesis for this research question was, “There were no significant differences in teachers’ perceptions and usage of technology based on teaching position.” A one-way ANOVA using SPSS was used to test for significant differences and the assumptions were tested to insure the validity of the results. This question determined if there were significant differences in perceptions (dependent variable) and usage of technology based on teaching position (independent variable).

Dependent variable scores were examined to determine if potential outliers existed in the model. Box plots were used to identify any potential outlier within the model. There were no data points on the dependent variable scores among the different groups that fell outside of 1.5 standard deviations from the edge of the box, thus, concluding there were no outliers in the model. The assumption of normality was examined using Shapiro-Wilk’s test to determine if the scores on the dependent variable were normally distributed for all groups. This assumption was met as the significance value was greater than .05. The assumption of homogeneity of variances was examined using Levene’s test of equality of variances to insure that all variances on the dependent variable were equal for all groups. This assumption of homogeneity of variances was not violated because the significance level was greater than .05.

The results of the one-way ANOVA demonstrated significant differences on the teacher composite total score based on teaching position category, $F(6, 336) = 3.16$, $p = .005$, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey HSD post hoc test was used.

After examination of the results of the Tukey HSD post hoc tests for teacher composite score, it was determined the other teaching position group (M = 200.96, SD = 42.64) was significantly higher than the math and computer science teaching position group (M = 174.50, SD = 37.17), p = .016. Also, it was determined that the other teaching position group (M = 200.96, SD = 42.64) was significantly higher than the special education teaching group (M = 168.33, SD = 32.70), p = .021. All other comparisons were non-significant with p-values greater than the chosen alpha level of .05.

The results of the one-way ANOVA demonstrated significant differences on the student composite total score based on teaching position category, $F(6, 336) = 4.06$, p = .001, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey HSD post hoc test was used.

After examination of the results of the Tukey HSD post hoc tests for student composite score, it was determined the other teaching position group (M = 123.37, SD = 31.03) was significantly higher than the math and computer science teaching position group (M = 101.68, SD = 34.59), p = .006. Also, it was determined that the other teaching position group (M = 123.37, SD = 31.03) was significantly higher than the special education teaching group (M = 96.67, SD = 26.18), p = .009. All other comparisons were non-significant with p values greater than the chosen alpha level of .05.

Research Question 7

The hypothesis for this research question was, "There is no significant variance in teacher technology effectiveness scores based on demographic factors." Research Question 7 was tested by multiple regression. A multiple regression was used to determine if a relationship existed between the variables: usage of technology and perceived effectiveness of technology. A multiple regression was used to discover the significance of predictor variables (gender, age, and school enrollment) in contributing to the criterion variable (teaching equipment effectiveness composite score). Data for the criterion variable and predictor variables were compiled and entered into SPSS. Proper procedures for multiple regression followed.

The assumptions for multiple regression were examined to ensure data gave accurate predictors. A Durbin Watson test was run to check the independence of residuals. The test ensures there is no correlation between the residuals in the model. To meet the assumption, the value provided needs to be near two. The closer it is to two the less of a correlation there is between the residuals. The assumption was met because the value was near two.

The assumption of linearity was examined to make certain the relationship between X and Y showed a linear relationship. To determine if the assumption was met, an examination of the scatterplot of residuals was done to ensure that almost all of the residuals fell within the 95% confidence bands around zero (between +2 or -2). This assumption was met as almost all points on the scatterplot fell within this range.

The assumption for homoscedasticity looks to ensure the residuals are equal for all predicted values of the criterion. This assumption was tested using the plot of studentized residuals vs. the unstandardized predicted values. The assumption was met because the plot did not show evidence of residual spread increasing or decreasing as the predicted value of the criterion variable (teacher equipment effectiveness composite score) increases.

The assumption of no multicollinearity ensured the predictors within the test were not too strongly intercorrelated. This assumption was met due to having tolerance levels for all of the predictors above the .2 minimum that was needed for this assumption.

Examination of the standardized residuals were used to identify any potential outlier within the model. There were no data points on the dependent variable scores among the different groups that fell outside of 1.5 standard deviations from the edge of the box, thus, concluding there were no outliers in the model.

The assumption of normality was tested by examining the normal probability plot to assess overall normality of the residuals. Based on the distribution of residuals in the p-p plot we can assume that the assumption has been met.

Multiple Regression for Teacher Equipment Effectiveness

The multiple correlation coefficient showed the correlation between the observed and predicted values of the criterion variable. With a multiple correlation coefficient of .142, one would consider this as a low correlation between the predictors and criterion. The multiple correlation coefficient provided the strength of relationship between the criterion variable (teacher equipment effectiveness composite score) and the predictor variables (gender, age, and school enrollment). There was a coefficient of multiple determination (R^2) value of .020. This meant 2.0% of the variance in the criterion variable (teacher equipment effectiveness composite score) can be explained by the predictor variables (gender, age, and school enrollment).

The adjusted R^2 provided a more conservative value, safeguarding the research findings from the amplification of variables contributing to the predictive relationship by chance. R^2 was .020, but adjusted R^2 was .011 as the number of predictors and subjects were examined.

The standard error of the estimate (11.65) measured variability in the points around the regression line. It was the standard deviation of the data points distributed around the regression line. This meant this model had a standard deviation of 11.65 units of technology equipment effectiveness composite scores regarding the distance of the residuals from the regression (prediction) line.

This multiple regression revealed that the predictors (gender, age, and school enrollment) did not have the ability to predict teacher equipment effectiveness. The results of the R^2 reveal that gender, age, and school enrollment could not be used to predict teacher equipment effectiveness within high schools. As shown in Table 14 the ANOVA was not significant, F (3, 339) = 2.32, p = .075, thus, showing no significant relationship between age, gender, school enrollment, and teacher equipment effectiveness.

Multiple Regression for Teacher Software Effectiveness

Another multiple regression was completed to determine if any of the predictor variables (gender, age, enrollment, and teaching position) could be used to predict teacher software effectiveness composite scores. All assumptions were met.

The assumption of linearity was met in the regression with almost all of the residuals falling within the 95% confidence bands around zero (between +2 or -2) on the scatter plot of residuals. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (school effectiveness standards) well above the .2 minimum that was needed for this assumption.

Through examination of the assumptions for the residuals, the assumption of independence was met because there was no systematic pattern on the plot of residuals. Based on the distribution of residuals in the p-p plot one can assume that the assumption had been met. Assumption of homogeneity of variance of residuals was met as the residuals were the same across all values of X. There was a constant scatter of residuals along all values of X in this regression.

Tthe multiple correlation coefficient shows the correlation between the observed and predicted values of the criterion variable. With a multiple correlation coefficient of .111, one would consider this as a low correlation between the predictors and criterion. The multiple correlation coefficient provided the strength of relationship between the criterion variable (teacher software effectiveness composite score) and the predictor variables (gender, age, and school enrollment).

There was a coefficient of multiple determination (R^2) value of .012. This meant 1.2% of the variance in the criterion variable (teacher equipment effectiveness composite score) can be explained by the predictor variables (gender, age, and school enrollment).

The adjusted R^2 provided a more conservative value, ensuring the research findings from the amplification of variables contributing to the predictive relationship by chance. R^2 was .012, but adjusted R^2 was .004 as the number of predictors and subjects were examined.

The standard error of the estimate (16.83) measures variability in the points around the regression line. It is the standard deviation of the data points distributed around the regression line. This means this model has a standard deviation of 16.83 units of software equipment effectiveness composite scores regarding the distance of the residuals from the regression (prediction) line.

This multiple regression revealed the predictors (gender, age, school enrollment, and teaching position) did not have the ability to predict teacher software effectiveness. The results reveal that gender, age, and school enrollment could not be used to predict teacher equipment effectiveness within high schools. The ANOVA was not significant, F (3, 339) = 1.42, p = .236, thus showing no significant relationship between age, gender, school enrollment, and teacher software effectiveness.

Multiple Regression for Student Software Effectiveness

Another multiple regression was completed to determine if any of the predictor variables (gender, age, enrollment, and teaching position) could be used to predict student software effectiveness composite scores. All assumptions were met.

The assumption of linearity was met in the regression because almost all of the residuals fell within the 95% confidence bands around zero (between +2 or -2) on the scatter plot of residuals. The assumption of no multicollinearity was met due to having tolerance levels for all of the predictors (school effectiveness standards) well above the .2 minimum that is needed for this assumption.

Through examination of the assumptions for the residuals, the assumption of independence was met because there was no systematic pattern on the plot of residuals. Based on the distribution of residuals in the p-p plot, one can assume that the assumption was met. Assumption of homogeneity of variance of residuals was met as the residuals are the same across all values of X. There was a constant scatter of residuals along all values of X in this regression.

The multiple correlation coefficient showed the correlation between the observed and predicted values of the criterion variable. With a multiple correlation coefficient of .143, one would consider this as a low correlation between the predictors and criterion. The multiple correlation coefficient provided the strength of relationship between the criterion variable (student software effectiveness composite score) and the predictor variables (gender, age, and school enrollment).

The adjusted R^2 provided a more conservative value, warranting the fact that the research findings from the amplification of variables contributing to the predictive relationship by chance. R^2 was .021, but adjusted R^2 was .012 as the number of predictors and subjects were examined.

The standard error of the estimate (18.46) measured variability in the points around the regression line. It was the standard deviation of the data points distributed around the regression line. This meant this model had a standard deviation of 18.46 units of software equipment effectiveness composite scores regarding the distance of the residuals from the regression (prediction) line.

There was a coefficient of multiple determination (R^2) value of .021. This meant 2.1% of the variance in the criterion variable (student equipment effectiveness composite score) was explained by the predictor variables (gender, age, and school enrollment).

This multiple regression revealed that the predictors (gender, age, and school enrollment) did not have the ability to predict student software effectiveness. The results determined gender, age, school enrollment could not be used to predict student equipment effectiveness within high schools. The ANOVA was not significant, F (3, 339) = 2.38, p = .070, thus, showing no significant relationship between age, gender, school enrollment, and student software effectiveness.

Summary

The first research question was answered using descriptive analysis. Research Question 1 examined high school teachers' current technology usage patterns within the state of Indiana. Respondents were asked about type of access to technology. Second, respondents were asked to identify frequency for said technology utilization. Third, descriptive data for teacher software utilization were analyzed and reported. Last, student technology utilization descriptive data were reported and analyzed. Descriptive data for respondents' perceived effectiveness of said technologies were analyzed and reported for teacher technology effectiveness, teacher software effectiveness, and student technology effectiveness.

For Research Questions 2 and 3, Pearson correlations were conducted to ascertain the strength of association between equipment usage and perceived technology effectiveness and technology access and perceived effectiveness. For Research Question 2, as indicated by the test result, the more frequent the usage of technology equipment the higher perceived effectiveness of technology. For Research Question 3, as indicated by the test result, there was a correlation between the usage of software and perceived effectiveness. Both null hypotheses were rejected.

For Research Questions 4 through 6, a one-way ANOVA test was used to measure the significant differences in teachers' perceptions of technology usage and demographic factors, such as age, school enrollment size, and teaching position. The one-way ANOVA test was selected because there was one dependent variable and the independent variables had more than two levels for each of the null hypothesis

For Research Question 7, a multiple regression was used to determine whether a relationship existed between the variables: usage of technology and perceived effectiveness of technology. A multiple regression was used to discover the significance of predictor variables (gender, age, and school enrollment) in contributing to the criterion variable (teacher equipment effectiveness composite score and teacher software effectiveness composite score). The multiple regression was used in each of the cases showing a no significant relationship between age, gender, school enrollment, and teaching position and teacher equipment effectiveness, teacher software effectiveness and student software effectiveness, thus, failing to reject the null hypothesis in each case.

CHAPTER 5

RESULTS, IMPLICATIONS, AND RECOMMENDATIONS

Chapter 5 is divided into five sections: introduction, results, discussion, conclusions, and recommendations for further research. The second section presents a discussion of the findings, including a summary of the descriptive data and a summary of the hypotheses testing. The third section includes conclusions and summary of the research. The fourth section discusses the implications of technology usage patterns, access to technology, usage of technology and effectiveness of technology as a result of this research. The last section provides recommendations for future research.

The purpose of this quantitative study was to examine teachers' perceptions of technology in high schools. According to Always Prepped (2012), "using technology in the classroom—and using it effectively—might require some slight adjustments on the part of the teacher to sustain the effort, creative problem-solving and innovation required to actually improve learning through the use of technology" (para. 3). It was essential to understand how 21st century teachers manage their classrooms with the incorporation of technology. This study will help determine access teachers have to technology, how teachers are using technology, frequency of said technology, and effectiveness of technology. Understanding these factors should be a priority for school corporations when it comes time to developing a comprehensive technology plan.

As American schools strive to create effective environments where technology and learning are not just juxtaposed but rather fused together in order to create change, it is imperative to understand how technology has been integrated, what access teachers have to technology and even effectiveness of different types of technology. Data from the survey Teachers' Perceptions of Technology Effectiveness in High Schools were used to determine high school technology trends. An analysis was prepared to determine the type of access to technology, utilization of technology—equipment and software for both the teacher and the students, and perceptions of technology in the classrooms. The survey collected data from teachers, indicating gender, age, and school enrollment size. The survey provided data to determine the type of access teachers have to technology, the frequency of said technologies, type of software utilized by teachers, and effectiveness of said technologies. The survey provided data to determine technology trends in high school and teachers' perceptions of technology effectiveness.

In general, the research design involved 343 high school teachers, Grades 9 through 12, in the state of Indiana. High school teachers' perceptions of technology and effectiveness were collected using Qualtrics software. Statistical analysis of data included descriptive statistics regarding the mean, standard deviation, and frequency of selected items. Two Pearson correlations were used to test null hypothesis. Four one-way ANOVAs were used to test null hypotheses. A multiple regression was used to see if the predictors (gender, age, school enrollment, teaching position) had the ability to predict teacher equipment effectiveness, teacher software effectiveness, and student software effectiveness.

Results

The findings of this study were presented in Chapter 4 as were the results of the statistical analysis. The examination of the findings is presented in five categories: (a) demographic data; (b) teacher technology access, frequency, and perceived effectiveness of said technologies; (c) teacher software usage, and perceived effectiveness of said technologies; (d) student software usage and perceived effectiveness of said; and (e) descriptive data by categories (age, enrollment), (f).

Summary of Descriptive Data

Surveys were electronically emailed to approximately 1,500 teachers, Grades 9 through 12, in the state of Indiana. Teachers were asked to provide demographic information about themselves and their schools, including gender, age, school enrollment number, and teaching position.

In all, 343 high school teachers, Grades 9 through 12, responded to the survey instrument, which examined technology patterns, access, frequency, usage, software, and perceptions of effectiveness. Of these 343 respondents, 129 were men (37.6%), and 214 (62.4%) were women. In terms of the age of respondents, 30 (8.7%) were 29 and under, 72 (21.0%) were in the age range 30 to 40, 106 (30.9%) were in the age range 41 to 50, and 135 (39.4%) were 51 and older, making up the sample group.

The respondents represented high schools in the state of Indiana with enrollments ranging from small to large. For the 343 respondents that participated in the study, 38 (11.1%) identified their school enrollment as 400 and under. Eighty-eight respondents (25.7%) identified their school enrollment number in the range of 401 to 800, and 217 (63.3%) of respondents identified their school enrollment number within the range of 801 or more.

Participants involved in the study were asked to select the best descriptor for their current teaching position. Of the 343 respondents who participated in the study, 67 (19.5%) were

English/language arts, 22 (6.4%) fine arts/music, 40 (11.7%) mathematics/computer science, 68 (19.8%) science, 43 (12.5%) social studies/social sciences, 21 (6.1%) special education, and 82 (23.9%) were in the category of other. The following is a summary of the descriptive data findings and the conclusions of the analysis.

Teacher Technology Access, Frequency, and Effectiveness

Teacher technology access. The Teachers' Perceptions of Technology Effectiveness in High Schools survey asked high school teachers their perceptions of access to technology in the classroom. The teacher respondents reported all technologies they had access to in the classroom. Respondents were provided a list of 11 options. Teacher respondents reported the top three technologies available in the classroom as LCD or DLP projectors (75.5%), stand alone computers (75.2%) and laptop computers (63%). Because the percentages for LCD and DLP projectors and stand alone computers are so similar, the percentages possibly suggest teachers are using stand alone computers while using projectors. In a study completed by PBS LearningMedia (2013), teachers noted one of the highest uses of technology "among those with access to technology" (p. 20) as projectors as a teaching tool used by teachers at 90%, and personal computers or laptops was 73%.

Teacher respondents also reported access to tablet or device of the like (e.g. Chromebook, e-reader, or iPad) at 60%. Even though respondents did report this technology as the highest in terms of access to technology, the results are similar to the study completed by PBS LearningMedia (2013) where 66% of teachers reported having access to a similar device. These results could suggest the trend is that school corporations are moving towards utilization of the tablet or like device in classrooms.

Frequency of technology utilization. The Teachers' Perceptions of Technology Effectiveness in High Schools survey asked high school teachers their perceptions of how often they used said technologies. The teacher respondents reported the frequency for each of the 10 options provided. Teacher respondents reported the following top three types of technologies as a part of their daily usage, stand alone computer (68.5%), LCD or DLP projectors (54.8%), and laptop computer (46.9%), whereas the PBS LearningMedia (2013) study identified the following top three as interactive personal computers or laptops (66%), white board (54%), and projectors (44%). Indiana high school teachers are on par with a national study on how teachers are using technology and the frequency of usage. The above numbers reflect, "technology is a critical part of learning and teaching in today's classrooms" (PBS LearningMedia, 2013, para. 4).

Effectiveness of teacher technology. Based on the survey results for perceived effectiveness of each technology, LCD and DLP projectors had the highest average percent for the category exceptionally effective (43.7%). The second highest rated exceptionally effective technology was the stand alone computer (31.2%), and the third highest rated was the laptop computer (30.9%). These results seem to suggest that the technologies teachers are utilizing are the technologies they perceive most effective.

Also noteworthy is a least effective technology. Based on the survey results, teachers perceived the MP3 player or iPod not to be effective in the classroom (44.3%). Further research understanding the reason why this technology was least effective for teachers in the classroom would be needed. However, a music teacher might see MP3 player as being a necessary tool in the classroom whereas a math teacher might not see the need. Further research would need to be conducted to see if these trends for teacher access, usage and perceptions of effectiveness would shift from teacher preference of personal computers to mobile devices, depending on the growing numbers of school corporations adopting one-to-one technology plans.

Student Software Usage and Perceived Effectiveness of Technologies

Student software usage. The Teachers' Perceptions of Technology Effectiveness in High Schools survey asked high school teachers their perceptions of how frequently their students used said software in the classroom. The teacher respondents reported the rate of frequency for 15 different types of software. Teacher respondents reported as the top three types of software used in the classroom on a daily basis as software for communication via email, network or Internet (29.2%), software to learn or practice content skills (21.6%), and software for written text (21.0%). Also, respondents reported, as the highest never used software for students in the classroom, the blog or wiki discussion (67.4%). With further research down the road, blogs and wikis could become an increasing used tool for teaching and learning in the highs schools.

Student software effectiveness. Based on the survey results for perceived effectiveness of software for students and learning, written text had the highest average percent for the category exceptionally effective (36.4%). The second highest rated exceptionally effective software for students and learning was research (31.8%), and the third highest rated was communication via email, network or Internet (30.3%). These results seem to suggest that teachers' perceptions of software for students and learning are connected to core areas of writing, speaking and researching. For further understanding of how these areas are used in connection with technology and student learning, a future study is needed. Interestingly, technology is to be used as a tool to enhance learning, and as noted by Collins & Halverson (2009), "it [technology] has become central to people's reading, writing, calculating and thinking, which are the major concerns of schooling" (p. 2).

Also noteworthy is least effective software. Based on the survey results, teachers perceived software for social networking websites to be least effective (37.3%). Further research understanding the reason why this software was least effective for learning and students. Perhaps the idea of socializing versus learning causes teachers to perceive this software as ineffective.

Descriptive Data by Age Category

29 and under. Based on the survey results, a composite total for respondents 29 and under was added together. The composite total included teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents 29 and under was $M = 188.3$, $SD = 34.3$, and the composite total for student usage and perceived technology effectiveness was $M = 113.8$, $SD = 30.1$. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was $M = 186.6$, $SD = 41.7$. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the age range 29 and under. The overall whole composite score for students was $M = 113.2$, $SD = 32.0$. The overall whole sample student composite score was lower than respondents 30 to 40. Although a slight difference in the composite totals among the age groups, further investigation into where the variance lies was needed to see if there are significant differences. According to a study by Gorder (2008), there were no significant differences that existed for technology use and integration based on gender, age, or teaching experience.

30 to 40. The average teacher composite total for respondents 30 to 40 was *M* = 190.7, *SD* = 39.0, and the composite total for student usage and perceived technology effectiveness was *M* = 116.3, *SD* = 28.4. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the age range 30 to 40. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was lower than respondents 30 to 40. The participants in the age group 30 to 40 scored higher on both composite totals possibly supporting ideas presented by Prensky regarding the digital divide, where digital immigrants or "today's older folk" (Prensky, 2001, para. 7) are in the process of learning this new language called technology.

41 to 50. Findings for the age range 41 to 50 include a composite total that was added together. The average teacher composite total for respondents 41 to 50 was *M* = 193.3, *SD* = 43.9, and the composite total for student usage and perceived technology effectiveness was *M* = 117.2, *SD* = 33.2. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the age range 41 to 50. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was lower than respondents 41 to 50. The latter findings seem to refute the idea that age affects perceptions and usage of technology effectiveness (Gorder, 2008). Further study in this area is needed to understand if the difference lies beyond usage or output effectiveness.

51 and over. A composite total for respondents in the age range 51 and older was added together. The average teacher composite total for respondents 51 and older was *M* = 178.8, *SD* = 42.1, and the composite total for student usage and perceived technology effectiveness was *M* = 108.2, *SD* = 32.8. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was higher than respondents in the age range 51 and older. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was higher than respondents 51 and older. A potential reason the composite score was higher for the whole sample than respondents in the 51 and older age group is that older individuals are still trying to learn the new technology or even possibly because "Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language" (Prensky, 2001, para. 9). This perception could support the idea that younger teachers might be more comfortable mastering these new digital skills due to growing up using the skills, therefore, resulting in a perception of higher effectiveness rating of technology by whole group.

Descriptive Data by Enrollment

400 and under. A composite total for respondents in the school enrollment size of 400 and under was added together. The composite total includes teacher technology utilization, perceived teacher technology effectiveness, teacher software usage, and perceived teacher software effectiveness. The average teacher composite total for respondents in the school enrollment size of 400 and under was *M* = 194.2, *SD* = 45.0, and the composite total for student usage and perceived technology effectiveness was *M* = 116.1, *SD* = 32.8. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the school enrollment size of 400 and under. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was lower than respondents in the school enrollment size of 400 and under. This perception suggested the possibility that smaller schools either have better access to technology, upkeep for technology, or even the possibility of technology training, time, access, and cost, supporting the higher technology effectiveness scores (Smerdon et al., 2000).

401 to 800. The average teacher composite total for respondents in the school enrollment size of 401 to 800 was *M* = 181.5, *SD* = 39.9, and the composite total for student usage and perceived technology effectiveness was *M* = 115.6, *SD* = 30.4. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was higher than respondents in the school enrollment size of 401 to 800. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was lower than respondents in the school enrollment size of 401 to 800. When comparing small schools to larger ones, issues that delineate the two include bureaucracy, amount of support, and rapport between teachers and students (Lee & Loeb, 2000); therefore, it is possible the perception that an enrollment size of 401 to 800 might not perceive student technology as effective as the whole sample composite score due to politics, administrative support or even camaraderie among teachers when working with students. There may not be enough money in these corporations to purchase or upkeep computers. Teachers might be overworked and even might not feel administrative support in using technology and teaching with technology. However, the same argument can be made for the reason why smaller school enrollments perceive teacher technology more effective than the whole sample population. To better understand why there is a split in this enrollment category, with research is needed.

801 or more. The findings for respondents, enrollment size of 801 or more, was added together for a composite total of *M* = 187.4, *SD* = 41.8, and the composite total for student usage and perceived technology effectiveness was *M* = 111.7, *SD* = 32.5. A comparison of age group mean to whole sample mean was completed. The overall whole sample teacher composite score was *M* = 186.6, *SD* = 41.7. The overall whole sample composite score for student technology utilization and effectiveness was lower than respondents in the school enrollment size of 801 or more. The overall whole composite score for students was *M* = 113.2, *SD* = 32.0. The overall whole sample student composite score was higher than respondents in the school enrollment size of 801 or more. Again, there was a split here between perceptions of how technology effectiveness is working for teachers versus students. This dichotomy of perception in the composite score for teachers and for students could be contributed to teachers being comfortable using technology for themselves versus how technology is being used with students.
According a study by Byron (1995), there are several limitations when it comes to teacher effectiveness when using technology in instruction-lack of training, lack of support, and doubts about whether technology would really enhance student learning. This perception regarding student effectiveness with technology could really be determined by a number of variables.

Summary of Hypothesis Testing and Conclusions

The following is a summary of the 6 hypotheses tested and the conclusions drawn from the results.

1. The first hypothesis stated, "There was no relationship between frequency of technology equipment usage and perceived effectiveness." This hypothesis was tested using a Pearson correlation. This hypothesis was rejected because the results revealed there was a significant positive relationship between teacher technology equipment utilization and perceived technology effectiveness. This positive relationship is evident with a Pearson correlation value of r =.455, p = < .001. As indicated by the test result, the more frequent the usage of technology equipment the higher perceived effectiveness of technology.

   Conclusion: There was a significant positive relationship between teacher technology utilization and perceived effectiveness. Any number of factors can affect whether teachers use technology in schools, specifically age, teaching experience, gender, content area, and school enrollment (Bebell et al., 2008; Van Braak, 2001). Fabry and Higgs (1997) stated other factors can affect perceptions and usage of technology—attitudes, training, time, access, and cost. It is possible that a teacher's belief of the axiom "practice makes perfect" can be applied here. The perception maybe the more one uses technology then the more comfortable one becomes with that particular tool, making that tool effective.

2. The second hypothesis stated, "There was no relationship between frequency of technology software utilization and perceived effectiveness." This hypothesis was tested using a Pearson correlation. This hypothesis was rejected because the results

revealed there was a significant positive relationship between teacher technology equipment utilization and perceived technology effectiveness. This positive relationship is evident with a Pearson correlation value of r =.642, p = < .001. As indicated by the test result, the more frequent the usage of software the higher perceived effectiveness of technology.

Conclusion: There was a significant positive relationship between teacher software utilization and perceived effectiveness. This conclusion is supported by research completed by Budin (1999). Budin's research indicated that schools placed priority on acquiring software and equipment rather than training. It is possible that school corporations still place emphasis on software access versus the various ways in which software utilization can be manipulated in classrooms. Therefore, teachers may perceive access and utilization of software as effectiveness.

3. The third hypothesis stated, "There were no significant differences in teachers' perceptions and usage of technology based on age." This hypothesis was tested using a one-way ANOVA. The results of the one-way ANOVA demonstrated significant differences on the teacher composite total score based on age category with $F(3, 339) = 2.77$, $p = .042$, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey HSD post hoc test was used. After examination of the results of the Tukey HSD post hoc tests, it was determined the 41 to 50 age group (M = 193.32, SD = 43.86) was significantly higher than the 51 and older age group (M = 178.83, SD = 42.05). All other comparisons were non-significant with p-values greater than the chosen alpha level of .05. As indicated by the test results, teachers within the age category 41 to 50

perceive technology effectiveness higher and have a higher frequency of technology usage than teachers in the age category of 51 and older.

Conclusion: Based on the one-way ANOVA results, there were significant differences between the age categories 41 to 50 and 51 and older; therefore the hypothesis was rejected. Demographic factors can affect whether teachers use technology in schools, including age (Bebell et al., 2008; Van Braak, 2001). The results support the research of younger generations using technology in the classroom with greater ease or "better than others" (Prensky, 2001, para. 7). It is possible that a younger teacher may have grown up with greater access to technology in his or her personal life, leading to the incorporation of it in his or her professional life as well.

4. The fourth hypothesis stated, "There were no significant differences in teachers' perceptions and usage of technology based on enrollment." This hypothesis was tested using a one-way ANOVA. The results of the one-way ANOVA demonstrated lack of significant differences on the teacher composite total score based on the category of school enrollment size. The results of the one-way ANOVA demonstrated this lack of significant differences, $F(2, 340) = 1.32$, $p = .268$, two-tailed. The null hypothesis was retained. Any differences among the groups could be contributed to chance. No post hoc tests were necessary. The results of the one-way ANOVA demonstrated lack of significant differences on the student composite total score based the category of school enrollment size. The results of the one-way ANOVA demonstrated this lack of significant differences, $F(2, 340) = .648$, $p = .524$, two-tailed. The null hypothesis was retained. Any differences among the groups could be contributed to chance. No post hoc tests were necessary.

Conclusion: There were no significant differences across school enrollment size on usage of technology and perception of technology effectiveness. As previously stated in Chapter 2, when school enrollment size is mentioned in studies regarding technology, there is often ambiguity. However, different schools may have different policies in place regarding technology. The results in this study do not support all of the research because there are factors that could affect technology including school size. School enrollment size is a factor that can potentially affect teachers' usage of technology in classrooms. Recent research has focused on school size as a factor in technology usage (Hargreaves & Fink, 2000; Lee & Smith, 1997). When comparing small schools to larger ones, issues that delineate the two include bureaucracy, amount of support, and rapport between teachers and students (Lee & Loeb, 2000).

5. The fifth hypothesis stated, "There are no significant differences in teachers' perceptions and usage of technology based on teaching position." This hypothesis was tested using a one-way ANOVA. The results of the one-way ANOVA demonstrated significant differences on the teacher composite total score based on teaching position category, $F(6, 336) = 3.16$, $p = .005$, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey HSD post hoc test was used.

After examination of the results of the Tukey HSD Post Hoc tests, it was determined the other teaching position group ($M = 200.96$, $SD = 42.64$) was significantly higher than the math and computer science teaching position group ($M = 174.50$, $SD = 37.17$). Also, it was determined that the other teaching position group

(*M* = 200.96, *SD* = 42.64) was significantly higher than the special education teaching group (*M* = 168.33, *SD* = 32.70). All other comparisons were non-significant with *p*-values greater than the chosen alpha level of .05.

The results of the one-way ANOVA demonstrated significant differences on the student composite total score based on teaching position category, $F(6, 336) = 4.06$, $p = .001$, two-tailed. Within the model, significant differences were demonstrated and in order to determine where the differences lie, a Tukey hsd post Hoc test was used.

After examination of the results of the Tukey HSD post hoc tests, it was determined the other teaching position group (*M* = 123.37, *SD* = 31.03) was significantly higher than the math and computer science teaching position group (*M* = 101.68, *SD* = 34.59). Also, it was determined that the other teaching position group (*M* = 123.37, *SD* = 31.03) was significantly higher than the special education teaching group (*M* = 96.67, *SD* = 26.18). All other comparisons were non-significant with *p* values greater than the chosen alpha level of .05.

Conclusion: There were significant differences in teachers' perceptions and usage of technology based on teaching position. For the teacher and student composite scores, the other teaching category had a higher mean when compared to the math and computer science teaching group. As well, the other teaching category had a higher mean when compared to the special education teaching group. Teachers in the other teaching category perceive technology to be more effective and have a higher rate of usage than teachers in the math, computer science, or special education. In Chapter 2, it was stated a variable that could affect technology usage was teaching position and/or discipline. Redmann and Kotrlik (2004) found teachers in certain teaching positions were experimenting various methods for technology usage in teaching and learning situations. Agriscience, business, and marketing teachers were trying to find ways to implement technology usage scenarios for improved learning and teaching (Redmann & Kotrlik, 2004). Differences were noted among various disciplines, albeit few (Guidry & BrckaLorenz, 2010). Further research would need to be completed to determine who went into the other category. The categories were broken up into a generalized way as to apply to most teachers; however, not all positions would fall under the categories provided (English/language arts, fine arts/music, mathematics/computer science, science, social studies/social sciences, special education and other). One possibility for the significant difference in the other category is that business teachers who use computers might have felt other was the best possible category. Another possibility is that certain curriculums allow for easier implementation of technology. Mathematics teachers may perceive it more difficult to implement technology into their curriculum, whereas English teachers will have a more natural fit with writing, reading, speaking, and so on.

6. The sixth hypothesis stated, “There is no significant variance in teacher technology effectiveness scores based on demographic factors.” A multiple regression was used to determine if a relationship exists between the variables usage of technology and perceived effectiveness of technology. A multiple regression was used to discover the significance of predictor variables (gender, age, and school enrollment) in contributing to the criterion variable (teaching equipment effectiveness composite score).

This multiple regression revealed that the predictors (gender, age, and school enrollment) did not have the ability to predict teacher equipment effectiveness. The ANOVA was not significant, F (3, 339) = 2.32, p = .075, thus showing no significant relationship between age, gender, school enrollment, and teacher equipment effectiveness.

This multiple regression revealed the predictors (gender, age, school enrollment, and teaching position) did not have the ability to predict teacher software effectiveness. The ANOVA was not significant, F (3, 339) = 1.42, p = .236, thus, showing no significant relationship between age, gender, school enrollment, and teacher software effectiveness.

Again, this multiple regression revealed that the predictors (gender, age, and school enrollment) did not have the ability to predict student software effectiveness. The ANOVA was not significant, F (3, 339) = 2.38, p = .070, thus, showing no significant relationship between age, gender, school enrollment, and student software effectiveness.

Conclusion: The three multiple regression showed no significant differences which supports the study by Gorder (2008). Gorder's study concluded there were no significant differences for technology use and integration based on gender, age, teaching experience, and content area.

Summary of the Study

This study was created to examine high school teachers' perceptions of technology in the classroom. The major research questions that guided this study were

1. What are current technology usage patterns within schools in the state of Indiana?

2. Is there a relationship between frequency of technology equipment usage and perceived effectiveness?
3. Is there a relationship between technology software utilization and perceived effectiveness?
4. Are there significant differences in teachers' perceptions and usage of technology based on age?
5. Are there significant differences in teachers' perceptions and usage of technology based on school enrollment size?
6. Are there significant differences in teachers' perceptions and usage of technology based on teaching position?
7. Do demographic factors predict a significant amount of variance in the teacher technology effectiveness?

Cafes, niches, airports, supermarkets, and schools—a commonality among the five is technology. Technology is not going away and if anything, will only continue to change at a rapid pace. As reported in the review of the literature, technology usage has become a focus of many school corporations with a shift in the role of the educator from the sage on the stage to the guide on the side. The role will continue to undergo changes indefinitely (Always Prepped, 2012; Collins & Halverson, 2009). A portion of the shift in education includes technology and the role technology will have on teaching and instructing. Students today are considered digital savvy (Prensky, 2001), and the educational environment is changing to meet the needs of its cliental. The transformation is similar to "the transition from apprenticeship to universal schooling that occurred in the 19th century as a result of the industrial revolution" (Collins & Halverson, 2009, p. 1). Due to the latter points, emphasis on understanding the role of technology and teachers' access, usage, and effectiveness is imperative for successful teaching and learning. The current study supports the access teachers have to technology, how teachers are using technology, to what extent technology is being used, along with the perceived effectiveness of technology. When asked, respondents indicated that they used stand alone computers. Specifically, 75.2% of high school teachers identified having access to stand alone computers. Also, 75.5% of respondents identified having access to LCD or DLP projectors in the classroom. The results show that a large percentage of respondents have the ability to use said technology for teaching and learning in the classroom. One may conclude since a high number of teachers have access to stand alone computers that those same teachers are probably utilizing this technology too. The same could be said for some of the other descriptive data trends reported in the study.

There was a significant positive relationship between teacher technology utilization and perceived effectiveness. Any number of factors can affect whether teachers use technology in schools, specifically age, teaching experience, gender, content area, and school enrollment (Bebell et al., 2008; Van Braak, 2001). Fabry and Higgs (1997) stated other factors can affect perceptions and usage of technology—attitudes, training, time, access, and cost. It is possible that the axiom "practice makes perfect" can be applied here. The perception maybe the more one uses technology (time) then the more comfortable one becomes with that particular tool, making that tool effective.

Also, there was a significant positive relationship between teacher software utilization and perceived effectiveness, and this is supported by research completed by Budin (1999). Some schools place a priority on acquiring software and equipment. It is possible that school corporations still place emphasis on software access versus the various ways in which software utilization can be manipulated in classrooms. Therefore, teachers may perceive access and utilization of software as effectiveness. Another possibility exists as well. It is possible that teachers believe through usage of technology it or said technology is effective. According to Bandura (1997), one of the most commanding sources of self-efficacy is mastery experience. So, teachers may be more comfortable with technology, which is reflected in their perceived effectiveness of said technology.

Based on the results, there were significant differences between the age categories 41 to 50 and 51 and older; demographic factors can affect whether teachers use technology in schools, including age (Bebell et al., 2008; Van Braak, 2001). The results support the research of younger generations using technology in the classroom with greater ease or "better than others" (Prensky, 2001, para. 7). Digital natives have been defined as individuals born into a society of technology (Prensky, 2001). It is possible the results may show a significant difference based on a comparison between different generations.

Another finding that was determined as significant was perceptions and usage of technology based on teaching position. For the teacher and student composite scores, the other teaching category had a higher mean when compared to the math and computer science teaching group. As well, the other teaching category had a higher mean when compared to the special education teaching group. There are differences among various disciplines (Guidry & BrckaLorenz, 2010).

Implications

Technology truly has created many different ways for teachers to create, connect, document, write, research, and the list goes continues. Technology has been around for some time, and people would even debate about the exact date of origin; however, generations of students are now able to communicate with others, research, read, write, and most notably, take control of their learning (Education Reform Studies, 2013). Students can “generate, obtain, manipulate, or display information” and technology is one medium that conveniently allows students to perform the latter tasks (Education Reform Studies, 2013, para. 1). Technology is a venue where teachers can connect with students and create a non-tradition teaching environment that is both engaging and educational (National Education Association, 2008). Technology that is used with a purpose to be productive in class will allow students and teachers to spend time analyzing, synthesizing, and assimilating material (Johnson et al., 2011).

The implications of this study and their application for high school teachers are as follows:

1. Although this study showed support for technology access and usage in high schools, the respondents seemed content using stand alone computers versus tablets or a device of like. Even though 206 (60.1%) respondents out of 343 reported access to a tablet device, only 98 (28.6%) reported using the device on a daily basis. If schools are providing tablets for teachers to utilize, it is interesting less than a majority of teachers are using this device daily. This could mean additional professional development is needed for the possibilities of this device. The transformation of schools to one-to-one schools where every teacher and student has a mobile device will help encourage usage of tablets; however, adding increased opportunities for professional development is needed. School leaders will need to find additional opportunities to encourage teachers to use devices. School leaders might require teachers to bring devices to meetings in order to use or learn a new way to use an app. If requirements could be set for teachers or expectations of using this device in this

particular, then there may be an increase in the device usage and perception of it as well.

2. This study found that the other teaching category, over math and computer science teaching category, had higher means when comparing composite totals. The results indicated that teachers in the other category find technology more effective. The disparity may be due to a limited number of descriptors in the teaching category; therefore, *other* had a greater number of teachers. Another possibility is that math and computer science teachers are not utilizing technology at a similar rate other teachers are doing so. Specialized professional development programs to learn new technology and to integrate technology into the classroom should focus on math curriculum as well as all curriculums. These results could also indicate a disconnect between the world of the teacher and the student. As Prensky (2010) has stated many classroom environments contain a teacher who is a digital immigrant, unable or incapable of using technology as an effective teaching tool.
3. Encouraging collaboration among teachers in order for the sharing of ideas to occur is important. Based on the results, there were significant differences between the age categories 41 to 50 and 51 and older; demographic factors can affect whether teachers use technology in schools, including age. Sharing ideas and strategies for using technology through collaboration could increase technology usage. Even the idea of best practices with technology could be used as a means of collaboration. For instance, if there are two schools within the corporation, have groups with varying demographics collaborate digitally so to encourage growth among teachers using technology of all ages. Reinforcement and repetitive practice will have the digital

immigrants become more comfortable using technology. School leaders could use technology goal setting as a way to encourage various usage of technology. School leaders could encourage goal setting and reflection as a way for teachers to effectively learn. Even though teachers are using technology, many still were not really using blogs or wikis. As new technology becomes available, replacing some of the antiquated forms of technology in the school.

4. According to this study, there was a significant positive relationship between teacher software utilization and perceived effectiveness. Because teachers are busy teacher and planning, there should be other time to work on and integrate technology in the classroom. Even offering professional development for technology during the summer. School leaders could allow for teachers to attend the professional development in person or as a means to promote the usage of said device allow teachers to watch the professional development online.

Research Recommendations

Based on the high school teachers' perceptions of technology access, usage, and effectiveness, the following recommendations for future research can be made:

1. This study has provided data on high school teachers' perceptions of technology in the classroom, focusing on access, usage and effectiveness. The study should be repeated next year to create trend data, especially with many school corporations moving toward one-to-one device usage.
2. This study was restricted to a specific geographic location and population. The population for this study was high school teachers, Grades 9 through 12, in the state

of Indiana. A comparative study should be conducted to examine this study with what is happening across the nationally.

3. Further study into what are the best methods for technology instruction is needed to move teachers from the traditional uses of technology to the seemingly endless possibilities. This would enable teachers to move from being users of technology to innovators using technology.
4. A study should be conducted to examine perceptions of technology based on the correlation between professional development of technology implementation (one-time training) versus ongoing professional development.
5. A qualitative study should be conducted in order to interview teachers who use best practice with technology and technology integration in order to better understand how technology fits into teaching and learning in a classroom.
6. A study should be conducted to determine the best methods for technology implementation and instruction, especially regarding specific disciplines like mathematics.

Summary

The trials that schools and teachers will face in accessing, utilizing, and delivering technology in a constantly vacillating environment is simply keeping up with the changes, keeping up with the needs of the students, maintaining professional development opportunities, and finding time as well as resources to support these alterations. With fortitude and tenacity on behalf of teachers and schools, technology integration can be beneficial, moving teachers past the superficial uses of technology.

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APPENDIX A: SURVEY SENT TO INDIANA HIGH SCHOOL TEACHERS

Survey: Teachers' Perceptions of Technology Effectiveness in High Schools

Technology defined: Technology such as computers, or devices of the like that can be attached to computers (e.g., LCD projector, interactive whiteboard, digital camera), networks (e.g., Internet, local networks), and computer software. Not including non-computer technologies such as overhead projectors and VCRs (Gray, Thomas, & Lewis, 2010).

Classroom response system: Wireless system allowing a teacher to pose a question and students to respond using―clickers‖ or hand-held response pads, with responses compiled on a computer.

Document camera: Device that transmits images of 2- or 3-dimensional objects, text, or graphics to a computer monitor or LCD projector.

Blogs: Websites where individual or group creates a running log of entries that can be read by other users. Similar to a journal.

Wikis: Collaborative websites that allow users to freely create and edit web page content (e.g., Wikipedia).

Social networking websites: Online social networks for communities of people who share interests and activities or who are interested in exploring the interests and activities of others (e.g., Twitter, Facebook, Pinterest).

1. Please indicate what type (s) of access to technology you have in the classroom. Select all that apply.

   a = Stand alone computer
   b = Laptop computer
   c = Computer on cart or computer cart checkout
   d = Computer lab
   e = Tablet or like device (e.g., Chromebook, e-reader or iPad)
   f = Interactive whiteboards
   g = LCD or DLP projectors
   h = Smartphone, iPhone
   i = MP3 player, iPod
   j = Digital camera or document camera
   k = No computer access

2. Please use the scale to indicate how often you utilize technology as a classroom teacher.

   Technology Usage
   1 = Never
   2 = Once or twice per semester
   3 = Monthly
   4 = Once a week
   5 = Periodically during the week
   6 = Daily
   7 = All the time

a. Stand alone computer	1234567
b. Laptop computer	1234567
c. Computer on cart or computer cart checkout	1234567
d. Computer lab	1234567
e. Tablet or device of the like, such as Chromebook, e-reader or iPad	1234567
f. Interactive whiteboards	1234567
g. LCD or DLP projectors	1234567
h. Smartphone, iPhone	1234567
i. MP3 player, iPod	1234567
j. Digital camera or document camera	1234567

3. Please use the scale to identify how effective you believe each of these technologies is for teachers.

Belief in Effectiveness
1 = Ineffective
3 = Somewhat effective
5 = Effective
7= Exceptionally effective

a. Stand alone computer	1357
b. Laptop computer	1357
c. Computer on cart or computer cart checkout	1357
d. Computer lab	1357
e. Tablet or device of the like, such as Chromebook, e-reader or iPad	1357
f. Interactive whiteboards	1357
g. LCD or DLP projectors	1357
h. Smartphone, iPhone	1357
i. MP3 player, iPod	1357
j. Digital camera or document camera	1357

4. Please use the scale to indicate how frequently you use the following for classroom preparation, lessons, instruction, or administrative tasks.

Technology Usage
1 = Never
2 = Once or twice per semester
3 = Monthly
4 = Once a week
5 = Periodically during the week
6 = Daily
7 = All the time

a. Word processing	1234567
b. Database software (e.g., Access)	1234567
c. Spreadsheets and graphing programs (e.g., Excel)	1234567
d. Software for managing student records	1234567
e. Software for desktop publishing	1234567
f. Graphics, image-editing software (e.g., Photoshop)	1234567
g. Software for making presentations (e.g., PowerPoint, Prezi, Keynote)	1234567
h. Software for administering tests (e.g., Quia, Quizlet)	1234567
i. Simulation and visualization programs	1234567
j. Drill and skill/practice programs/tutorials	1234567
k. Subject-specific programs	1234567
l. The Internet	1234567
m. Blogs and/or wikis (definitions included on first page)	1234567
n. Social networking websites (definitions included on first page)	1234567
o. Other applications (specify)	1234567

5. Please use the scale to identify how effective you believe each of these technologies is for classroom preparation, lessons, instruction, or administrative tasks.

Belief in Effectiveness
1 = Ineffective
3 = Somewhat effective
5 = Effective
7= Exceptionally effective

a. Word processing	1357
b. Database management software (e.g., Access)	1357
c. Spreadsheets and graphing programs (e.g., Excel)	1357
d. Software for managing student records	1357
e. Software for desktop publishing	1357
f. Graphics, image-editing software (e.g., Photoshop)	1357
g. Software for making presentations (e.g., PowerPoint, Prezi, Keynote)	1357
h. Software for administering tests (e.g., Quia, Quizlet)	1357
i. Simulation and visualization programs	1357
j. Drill and skill/practice programs/tutorials	1357
k. Subject-specific programs	1357
l. The Internet	1357
m. Blogs and/or wikis (definitions included on first page)	1357
n. Social networking websites (definitions included on first page)	1357
o. Other applications (specify)	1357

6. Please use the scale to indicate how frequently your students perform the following activities while accessing or using educational technology in class.

Technology Usage
1 = Never
2 = Once or twice per semester
3 = Monthly
4 = Once a week
5 = Periodically during the week
6 = Daily
7 = All the time

a. Written text (e.g., word processing, desktop publishing)	1234567
b. Graphics or visual displays (e.g., graphs, diagrams, pictures, maps)	1234567
c. Learn or practice skills in content	1234567
d. Research (e.g., Internet searching, reference materials, library reference)	1234567
e. Communication with other (e.g., teachers, students, experts) via email, network, or Internet	1234567
f. Blog or wiki communication (definition on initial page)	1234567
g. Social networking websites (definition on initial page)	1234567
h. Problem solving, data analysis, or calculations	1234567

i. Experiments or measurements 1234567
j. Multimedia presentations 1234567
k. Art, music, movies, or webcasts 1234567
l. Demonstrations, models or simulations 1234567
m. Product development (e.g., computer-aided manufacturing or design) 1234567
n. Online class board for discussion 1234567
o. Course or teacher web page (e.g., Weebly) 1234567
p. Instant messaging (e.g., Remind 101) 1234567
q. Other applications (specify) 1234567

7. Please use the scale to identify how effective you believe each of these technologies is for students and learning.

Belief in Effectiveness
1 = Ineffective
3 = Somewhat effective
5 = Effective
7= Exceptionally effective

a. Written text (e.g., word processing, desktop publishing) 1357
b. Graphics or visual displays (e.g., graphs, diagrams, pictures, maps) 1357
c. Learn or practice skills in content 1357
d. Research (e.g., Internet searching, reference materials, library reference) 1357
e. Communication with other (e.g., teachers, students, experts) via email, network, or Internet 1357
f. Blog or wiki communication (definition on initial page) 1357
g. Social networking websites (definition on initial page) 1357
h. Problem solving, data analysis, or calculations 1357
i. Experiments or measurements 1357
j. Multimedia presentations 1357
k. Art, music, movies, or webcasts 1357
l. Demonstrations, models or simulations 1357
m. Product development (e.g., computer-aided manufacturing or design) 1357
n. Online class board for discussion 1357
o. Course or teacher web page (e.g., Weebly) 1357
p. Instant messaging (e.g., Remind 101) 1357
q. Other applications (specify) 1357

8. Please select your gender from the scale.

1= Male
2 = Female

9. Please select your age from the scale.

1 = 29 and under
2 = 30-40
3 = 41-50
4 = 51 and older

10. Please select the number of years you have been teaching from the scale.

1 = 10 and under
2 = 11-20
3 = 21 or more

11. Please select your school's total student enrollment from the scale.

1 = 400 and under
2 = 401 to 800
3 = 801 or more

12. Please identify the best descriptor for your current teaching position. Select all that apply.

1 = English/Language Arts
2 = Fine Arts/or Music
3 = Mathematics/or Computer Science
4 = Science
5 = Social Studies/or Social Sciences
6 = Special Education
7 = Other

APPENDIX B: EMAIL TO TEACHERS REGARDING COOPERATION/CONSENT TO PARTICIPATE IN STUDY

HIGH SCHOOL TEACHERS PERCEPTIONS OF TECHNOLOGY IN SCHOOLS

Colleagues,

As high school teachers, you are being invited to participate in a research study about the use of technology in classrooms among high school teachers in the State of Indiana. This study is being conducted by Heather Gianfagna, as part of a doctoral dissertation with Dr. Todd Whitaker serving as the faculty sponsor from the department of Educational Leadership at Indiana State University.

Survey link: http://indstate.qualtrics.com

There are no known risks if you decide to participate in this research study. There are no costs to you or the teachers in your building for participating in the study. The information provided for the study will help offer a greater understanding of technology usage, access and effectiveness among high school teachers in the state of Indiana. The survey will take approximately ten minutes to complete. The information learned in this study will provide general benefits in the study of technology usage among high school teachers and may provide benefits for teachers when using technology for preparation, instruction, and management.

This survey is anonymous. No identifying information including names, email addresses, or computer IP addresses will be collected; however, absolute anonymity cannot be guaranteed through the use of the Internet. Your answers and identity will not be able to be identified in this survey. In addition, your participation or non-participation in this survey will also not be identified. Individuals from the Institutional Review Board may inspect these records. Should data be published, no individual information will be disclosed.

Please follow this link to participate in the study:
https://indstate.qualtrics.com

Your participation in the study is voluntary and highly appreciated! By completing the survey you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer for any reason.

If you have any questions about the study, please contact Heather Gianfagna at 6575 Old Vincennes Rd., Floyds Knobs, IN 47119 (812) 542-8504, ext. 3090 or hgianfagna@nafcs.k12.in.us or hgianfagna@indstate.edu. You may also contact Dr. Todd Whitaker at Indiana State University, UH 317B, Terre Haute, IN 47809 (812) 237-2904 or Todd.Whitaker@indstate.edu.

If you have questions about your rights as a research subject or if you feel you have been placed at risk, you may contact Indiana State University Institutional Review Board (IRB) by mail at Indiana State University, Office of Sponsored Programs, Terre Haute, IN 47809, by phone at (818) 237-8217, or by email at irb@indstate.edu.

Your participation is greatly appreciated!

Sincerely,

Heather Gianfagna
High School Teacher
Floyd Central High School
6575 Old Vincennes Rd.
Floyds Knobs, IN 47119
812-542-8504, ext. 3090

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APPENDIX C: FOLLOW UP EMAIL

Greetings Again!

Thank you to the many who have helped with the survey *Technology Access, Usage, and Effectiveness among High School Teachers.* Your quick response was greatly appreciated! With your assistance, perceptions on technology access, usage and effective of technology in the high school classroom will be analyzed among districts in the state of Indiana. This link will be active for the remainder of this week. Please use the link below to complete the survey if you have not had the opportunity to do so already. All responses are anonymous, and the survey should take around five to seven minutes to complete. Your input is greatly appreciated!

Thank you in advance for your time and participation.

The survey can be found at this link: http://indstate.qualtrics.com

If you have any questions about the study, please contact me at (502) 645-8310 or at hgianfagna@indstate.edu. You may also contact my faculty sponsor, Dr. Todd Whitaker, at Indiana State University, UH 317B, Terre Haute, IN 47809 (812) 237-2904 or Todd.Whitaker@indstate.edu.

If you have any questions about your rights as a research subject or if you feel you have been placed at risk, you may contact the Indiana State University Institutional Review Board (IRB) by mail at Indiana State University, Office of Sponsored Programs, Terre Haute, IN 47809, by phone at (812) 237-8217, or by e-mail at irb@indstate.edu.

Sincerely,

Heather Gianfagna
High School Teacher

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