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Student and Teacher Perspectives of Technology Usage

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Student and Teacher Perspectives of Technology Usage

by

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Student and Teacher Perspectives of Technology Usage

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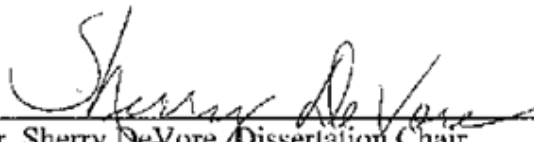
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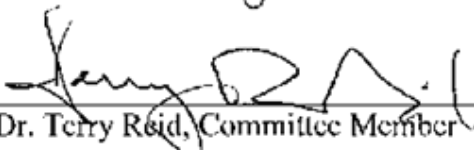
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_____   _____
Dr. Sherry DeVore, Dissertation Chair   Date   10-8-10

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Dr. Terry Reid, Committee Member   Date   10-8-2010

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Dr. Kevin Kopp, Committee Member   Date   10-8-10

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Lori Lynn Elliott

Signature _Lori Lynn Elliott_ Date: _10-8-10_

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Abstract

This study examined the use of technology by eighth grade students and teachers and perceptions of students and teachers toward technology use in the classroom and home. A mixed design method was selected to collect and analyze the data. Face-to-face interviews, field notes, and national survey results were used to triangulate the data. Three themes emerged from the study in response to the research questions: communication is the focus of technology use, students consider themselves more knowledgeable about technology than teachers, and technology use in the classroom is primarily a visual tool, rather than an interactive resource. Implications for educators include ongoing professional development, use of technology outside of school, and removal of perceived barriers.

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Chapter One

Introduction to the Study

Background

Society has changed dramatically in the last 20 years due to the advances of technology. Rosen (2010) stated, "Today's children have grown up in an environment in which technology is everywhere and much of it is invisible. Most children and adolescents have grown up with the largest storehouse of information in history, the Internet" (p. 26). Rosen explained the overwhelming amount of information and news available have "immersed current generations in a media diet filled with entertainment, communication, and any form of electronic media" (p. 2). Prensky (2010) discussed media and society:

> Today's young people must continuously choose among a plethora of very
> expensively produced demands on their attention: music, movies, commercials,
> TV, Internet, and more. They have learned to focus only on what interests them
> and on things that treat them as individuals rather than as part of a group or class.
> In an increasingly populated and crowded world, choice, differentiation,
> personalization, and individualization have become for today's young people, not
> only a reality, but a necessity. (p. 2)

Society's focus has progressed from manufacturing and creating goods to communication, networking, and information (Trilling & Fadel, 2009). Toffler (1980) proposed that technology would change the world in three technological waves: agrarian, industrial, and post-industrial. The agrarian wave represented the Agricultural Age as

tools such as plows were used to produce crops (Rosen, 2010). Rosen explained the second wave began in the late 1600s, and society transitioned from an agricultural-based world to an industrial society with inventions such as the steam engine. The Information Age, or computer age, emerged in the late 1950s as the third wave, when very basic technologies began to surface (Rosen, 2010).

Much of Toffler's (1980) ideas have come to fruition. Since 1991, there has been a shift from Industrial Age production to a Knowledge Age economy (Trilling & Fadel, 2009). Pink (2006) described the transition from Industrial Age to Knowledge Age:

We are moving from an economy and a society built on the logical, linear, computer-like capabilities of the Information Age to an economy and a society built on the inventive, empathic, big-picture capabilities of what's rising in its place, the Conceptual Age. (p. 1)

Pink (2009) supported Trilling and Fadel by explaining that 70% of job growth today comes from heuristic work; that is, work that requires creativity and novel solutions. The opposite of heuristic work is algorithmic tasks which have a single pathway to a conclusion (Pink, 2009). This transition from Industrial Age to Knowledge Age has had a profound impact on students.

Digital Natives

Due to the continuous use of technology, this generation has been characterized in various terms, such as: Net Generation, Generation Z, and Millenial Generation (Twenge, 2006). Prensky (2005) coined the term *digital native* to address the current generation of learners. A digital native refers to students born into the digital world generally after the 1980s (Prensky, 2005). Palfrey and Gasser (2008) suggested that digital natives have

created a network that blends human relationships with technology in a constantly connected environment. Many students may not have the opportunity to own or use the same types of digital devices; nonetheless, technology impacts the lives of citizens today due to the nature of the Information Age (Palfrey & Gasser, 2008).

Prensky (2008) stated, "Change is the order of the day in our kids' 21st Century lives. It ought to be the order of the day in their schools as well. Not only would students welcome it, they will soon demand it" (p. 5). Learning has also undergone a transformation over the past thirty years due to technology (Palfrey & Gasser, 2008). In a recent survey, "approximately 30% of students preferred taking courses that used extensive levels of technology" (Kvavik, 2005, p. 89). Students are able to access information quickly through the Internet. They can find answers at the click of a button and contact friends and experts around the world through social networking (Taranto & Abbondanza, 2009). Tapscott (2009) explained, "The new Web is a communications medium that enables people to create their own content, collaborate with others, and build communities. It has become a tool for self-organization" (p. 18). In contrast to the technology savvy digital natives, adults tend to be more reluctant toward technology (Tapscott, 2009). This is due to the lack of immersion in technology.

Digital Immigrants

Just as this generation has been called digital natives, educators are most commonly considered *digital immigrants* (Prensky, 2005). Digital immigrants are those adults not born into the digital world (Prensky, 2005). Lovely (2008) characterized the generations at school as: "Veterans, born 1922-1943; Baby Boomers, born 1944-1960;

Generation X, born 1960-1980; and Millenials, born 1980-2000" (p. 9). The digital

immigrants are those born prior to 1980 (Prensky, 2005).

Technological tools and ideas were not present until much later in the lives of the

digital immigrants. These immigrants are thought to have an accent in terms of their

technology use, just as a person coming to America would struggle with the English

language (Palfrey & Gasser, 2008). According to Prensky (2005), the digital immigrant

struggles with basic technological practices because they still have one foot in the past.

Technology and Education

The discrepancy between digital immigrants and digital natives impacts the

classroom. Groff and Haas (2008) reported, "Often, students find that these technologies,

so prevalent in their lives outside of school, are unwelcome in their classrooms" (p. 12).

Educators struggle with the balance of technology in instruction. It seems education is

lagging behind business, entertainment, and communication in technology usage and

integration (Groff & Haas, 2008). Rod Paige, former U.S. Secretary of Education,

acknowledged, "Education is the only business still debating the usefulness of

technology. Schools remain unchanged for the most part, despite numerous reforms and

increased investments in computers and networks" (as cited in Schwartz, 2008, p. 389).

Students recognize that technology allows them instant access to information,

content, and collaboration (Tapscott, 2009). Due to the generation divide, educators are

unsure of how to change instruction to meet this reality. According to Verhaagen (as

cited in Jayson, 2010):

They [students] know every piece of information they [students] want is at their

disposal whenever they need it. They [students] are less interested in learning

facts and learning data than in knowing how to gain access to it and synthesize it and integrate it into their life. (p. 1)

Jayson (2010) explained, "Younger students are immersed with technology, thus the educational system has to change significantly" (p. 3). Because of this concern, the federal mandate, No Child Left Behind (NCLB), requires eighth grade students to successfully pass a technology proficiency exam (Klinkefus, 2009). Klinkefus (2009) explained the technology proficiency assessment must be constructed and administered by each school district. The assessed skills should tie to the National Technology Standards for Students (Klinkefus, 2009). For students to achieve proficiency on this assessment, integration of technology in the classroom is necessary but may present a challenge for most educators (Prensky, 2005).

Integrating technology into classroom instruction requires more than just installing equipment, software, or gadgets in a school (Edutopia, 2008). Teachers must be provided with training and time to manipulate the new technological resource. The position espoused by Edutopia magazine (2008) is "effective technology integration must support key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to real-world experts" (para. 1).

<div align="center">**Statement of the Problem**</div>

Communication

Students and teachers have different perceptions concerning the use of technology in the learning process (Speak Up, 2009). Students and teachers also use technology differently in their own lives outside of school (Speak Up, 2009). The basic need to communicate provides an immense separation between teachers and students. Students

tend to be more comfortable with social networking, such as Facebook and texting (Mullan, 2008). In general, teachers respond better to e-mail and face-to-face discussions (Mullan, 2008). This discrepancy impacts student motivation and learning (Pink, 2009). The digital divide also causes teachers frustration and anxiety of how to connect with today's students (Mullan, 2008). Teachers and students typically use technology differently and possess conflicting views regarding the use of technology in the classroom (Speak Up, 2009).

Perceptions of Technology

Groff and Haas (2008) suggested that "there appears to be a gap between the traditional scholastic culture and the culture of today's learners" (p. 12). Cuban (2001) described technology in classrooms as "oversold and underused" (p. 12) because most schools have purchased computers but have failed to train teachers regarding the most effective use and implementation of equipment and technology. A study by Li (2007) highlighted teacher perceptions of technology. Li found that attitudes of teachers toward technology tend to be negative. Factors that influence this attitude include lack of training, resources, and time; dissonance between digital natives and digital immigrants; and resistance to change (Li, 2007).

Various studies have been conducted to examine student perceptions of technology use and how technology should be integrated into the classroom (Li, 2007; Speak Up, 2009). Studies by Kolikant (2009) and Spires, Lee, and Turner (2008) were conducted to examine the thoughts of students concerning technology and learning. Prensky (2008) stated, "The only way to move forward effectively is to combine what they [students] know about technology with what we [educators] know and require about

education" (p. 5). Marzano (2009) maintained teachers must use technology "thoughtfully, in accordance with what we know about good classroom practice" (p. 82).

Li (2007) examined views of 15 teachers and 575 students in Canada regarding technology in classrooms. Students in seventh through twelfth grades were part of the study. Spires, et al. (2008) studied 4,000 North Carolina middle grade students to find what engages them in school. The students were surveyed and interviewed (Spires, et al., 2008). The data from both studies showed students are highly motivated by technology, yet think teachers do not understand or use the same technology (Spires, et al., 2008). Kolikant (2009) maintained that students participating in his study believed they knew more than their teachers about technology. Thus, these students also thought they knew more about the educational potential for technology than their teachers (Kolikant, 2009).

The digital divide between students and teachers causes barriers to learning and student engagement. Digital natives have grown up immersed in technology. Most often, classrooms do not reflect the technology used outside of school (Groff & Haas, 2008). Educators recognize the challenges of integrating technology, such as lack of training, resources, and time (Li, 2007). Bridging the gap between digital natives and immigrants to increase student achievement is a major problem facing teachers today.

Purpose of the Study

The purpose of this case study was to examine eighth grade student and teacher perceptions of technology usage in one southwest Missouri school district. This age group was selected due to the mandatory Eighth Grade Technology Proficiency Exam given to all students across the nation in compliance with NCLB legislation (Klinkefus, 2009). Also, this grade level represents a pivotal time in the lives of learners in terms of

their understanding and use of technology (Klinkefus, 2009). Moreover, eighth graders represent the historical Net Generation, those born in the digital age. The results from the national technology survey, Speak Up Project, 2008, included attitudes and practices of eighth grade students and teachers. The results were used as a benchmark for analyzing the participants' perceptions and use of technology for this study. Additionally, this study explored possible barriers to technology integration in classroom instruction and student participation to determine how teachers and eighth grade students envision technology usage in an instructional setting.

Research Questions

Research questions provided a structure for gathering classroom data for this study. The research questions targeted eighth grade students and teachers. Responses provided information regarding students and teachers utilization and perception of technology in everyday practice and learning. The following questions served as a guide for the study:

1. In what manner do eighth grade students and teachers use technology in their everyday lives?

2. How do students and teachers envision using technology in the classroom?

3. What barriers do students and teachers perceive as reasons for limited technology use in the classroom?

Conceptual Underpinnings

Recognizing that learning is the focus of schools and classrooms, three major themes provided the framework for understanding the need for technology integration. These themes provided a construct to observe and understand the possible mixed

perceptions and usage of technology by both students and teachers. The three themes are: multiple intelligences, differentiated instruction, and best instructional practices.

Multiple Intelligences

Learning and instructing are complicated processes. Each student is wired with different interests, strengths, and weaknesses (Gardner, 1993). Gardner (1993) mapped his theory of Multiple Intelligences to explain how learners process information. Gardner (2004) believed that "an intelligence refers to a biopsychological potential of our species to process certain kinds of information in certain kinds of ways" (p. 1). Gardner (1993) identified at least eight types of intelligences ranging from mathematical/logical to naturalist.

Gardner (2000) saw value in using technology with students and advised educators to view the marriage of education and technology as a happy union only if the focus remained on student achievement. Gardner (2009) continues to advocate the use of technology to individualize instruction for students. More recently, Gardner (2009) stated, "It's certainly easier to individualize if you have one or just a few youngsters in your charge. But particularly in the era of the new digital media, individualizing has become much easier" (p. 33). Student learning needs can be met by understanding and building upon each student's intelligences (Tomlinson, 1998). Technology can help educators accomplish this task through the use of software, websites, blogs, podcasts, and digital video (Tapscott, 2009). Along with recognizing the particular intelligences of learners, students need individualized learning to achieve difficult skills or content.

Differentiated Instruction

Recognizing differences in students leads educators to change their instructional practices (Tomlinson, 1998). Teachers seek to tailor instruction for each student (Willis & Mann, 2000). The approach often selected is termed differentiated instruction. Differentiated instruction is a practice of differentiating content, process, and products (Willis & Mann, 2000). Tomlinson (1998) suggested three parameters for using differentiated instruction: "Learning environments must feel emotionally safe for learning to take place. Second, to learn, students must experience appropriate levels of challenge. Third, each brain needs to make its own meaning of ideas and skills" (pp. 2-3). Within each of these necessities for learning, it is evident students respond best as owners of their learning. To truly learn, information needs to be presented in meaningful ways and implemented to challenge students (Pink, 2009). Technology can offer a safe environment for students that challenges their thinking and supplies meaning to new ideas and skills (Tapscott, 2009). Tools, such as interactive whiteboards, blogs, interactive games, and student response systems, provide immediate feedback and instruction (Pitler, Hubbell, Kuhn, & Malenoski, 2007). Technology can serve as an effective tool to enhance best instructional practices (Marzano, 2009).

Best Instructional Practices

Another facet of instruction is selecting the best instructional practices. Marzano (2001) outlined research-based strategies to increase student achievement. Marzano (2001) noted nine effective strategies:

Identifying similarities and differences; summarizing and note taking; reinforcing effort and providing recognition; homework and practice; nonlinguistic

representation; cooperative learning; setting objectives and providing feedback;

generating and testing hypothesis; and cues/questions/advance organizers. (p. 7)

Marzano (2009) recommended teachers integrate research-based instructional strategies

as the basis for quality technology integration. Digital media tools provide a variety of

options for implementing Marzano's outlined strategies (Pitler,et al., 2007). Pitler, et al.

(2007) suggested "the use of word processing, web 2.0 tools, multimedia, and software to

address each of Marzano's effective strategies" (p. 11). Marzano (2009) summarized his

findings about technology integration:

Simply assuming that using this (interactive whiteboards) or any other

technological tool can automatically enhance student achievement would be a

mistake. As is the case with all powerful tools, teachers must use an interactive

whiteboard thoughtfully, in accordance with what we know about good classroom

practice. (p. 82)

Digital natives desire technology in the classroom because it mirrors their lives outside of

school (Speak Up, 2009). Educators face challenges with technology integration due to

expense, lack of training, and inexperience with digital tools (Tapscott, 2009).

Significance of the Study

The data gleaned from this study may be used to assist educators in making

instructional decisions and help teachers understand the world of the digital native and

the possible barriers to integration of technology. Prensky (2010) proposed, "The

teacher's job is to coach and guide the use of technology for effective learning" (p. 3).

November (2010) concluded, "Adding technology to the classroom is the easy part. The

difficult work is reshaping the relationship between teachers and students" (p. xi).

Sprenger (2010) surmised, "We [educators] need to use the technology tools, learn the digital dialogue, and understand and relate better to students. The key to learning is relationships" (p. xiii).

Overcoming barriers, such as lack of training, cost, and generational differences, will help prepare students for the 21st Century (Trilling & Fadel, 2009). The results of this study may assist professional development trainers and administrators to provide relevant training to bridge the gap between digital natives and digital immigrants, thereby increasing student achievement. The findings may assist board members and administrators in prioritizing funds for technology integration and professional development. Teachers may gain understanding of current technologies used by students and factors that motivate students.

Limitations

This case study was limited to the target population of eighth grade students and teachers of eighth grade students in a southwest Missouri public school district. The sample was comprised of 16 students and 12 teachers selected from the public junior high school to garner local perspectives. Students were selected based on their enrollment in basic or honors level classes and gender, to equally represent male and female students. Teachers were selected based on their teaching positions in core eighth grade classes: math, social studies, science, and communication arts.

For the purpose of this study, the national technology survey results from the Speak Up Project (2008) were limited to eighth grade students and eighth grade teachers. The Speak Up Project (2008) researchers gathered data regarding technology usage in classrooms and outside the learning environment through an online survey. Speak Up

(2008) researchers surveyed 281,000 students in grades K through 12 (Manzo, 2009).

Manzo (2009) explained all 50 states were represented in the study and included "28,000

teachers, 21,000 parents, and 3,000 administrators" (p. 10). The survey was limited to

school districts that registered to participate. Speak Up is an online survey, thus the

results are limited to those school districts willing to provide time and online access to

the survey (Project Tomorrow, 2010). The information gathered by the project was

shared with school leaders and policy makers in order to assist educators in preparing

students for the 21st Century (Project Tomorrow, 2010).

<div style="text-align:center">Assumptions</div>

The selection of eighth grade teachers was based on the assumption that teachers

of the core curriculum would be more apt to use integrate technology into their

instruction daily, than those eighth grade teachers of the arts or physical education. An

assumption was made that the interview participants answered the interview questions

based on their own experiences. This case study utilized the data from the Speak Up 2008

national survey; therefore, it was assumed the participants in the Speak Up project

answered honestly based on their personal use and perceptions of technology.

<div style="text-align:center">Definitions of Key Terms</div>

The following terms and definitions are essential to the foundation of the study:

Eighth Grade Proficiency Test

The goal of the Enhancing Education Through Technology Act of 2001 (E2T2)

was to "assist every student in crossing the digital divide by ensuring that every student is

technologically literate by the time the student finishes the eighth grade, regardless of the

student's race, ethnicity, gender, family income, geographic location, or disability"
(NCLB, 2009, para. 2).

Project Tomorrow

The goal of Project Tomorrow, a national education nonprofit group, is to ensure students are prepared for the 21st Century through the use of science, math, and technology to develop proficiencies needed to compete in the global market (Project Tomorrow, 2010).

Speak Up Project

A yearly, national research survey used to collect data from teachers, students, administrators, and parents in regard to education, technology, 21st Century skills, and the future of schools (Project Tomorrow, 2010).

<div align="center">

Summary

</div>

Technology is quickly changing and encompassing every aspect of life (Tapscott, 2009). On the surface, it would appear to be a simple task to bring the digital tools from the real world into the classroom environment; however, this has not been the case (Cuban, 2001). Belief systems and perceptions may cause barriers to the full implementation of technology in schools (Prensky, 2005).

This case study investigator researched the commonalities and differences between digital immigrants and digital natives. Rosen (2010) suggested, "We must rewire education or we risk losing this generation of media-immersed, tech-savvy students who are often brighter and more creative than we realize" (p. 226). Groff and Haas (2008) found classrooms successfully using digital tools also developed a partnership between the students and teachers. Prensky (2010) defined partnering as "emphasizing the roles of

each group, teachers and students, as different, but equal" (p. 15). Prensky (2010)

advised teachers to partner with students to prepare them for the future:

> Today's students will not live in a world where things change relatively slowly,
>
> but rather one in which things change extremely rapidly. So today's teachers need
>
> to be sure that, no matter what subject they are teaching, they are teaching it with
>
> that future in mind. (p. 5)

Chapter Two is a review of literature. The purpose of the literature review was to

provide understanding of the history of technology in education, generational differences,

technology and today's learners, technology integration in the classroom, high quality

staff development, 21st Century skills, and the national technology initiative. In Chapter

Three, the research design and methodology used during this case study were explained.

An analysis of the data and recommendations for future studies were presented in

Chapter Four and Chapter Five, respectively.

Chapter Two

Review of Related Literature

Technology seems to extend to every facet of society. Discussions regarding integration of technology into academic curricula are commonplace, even though the application may not be consistent. The review of literature for this study is organized to provide understanding of the history of instructional technology, technology and students today, generational differences, high quality staff development, emphasis on 21st century skills, and the national technology initiative. These concepts build a foundation of knowledge regarding technology and its impact on the learning community.

History of Instructional Technology

Description of Technology

Technology is more than just a combination of hardware and software, or a new gadget. Fitzgerald (2002) defined technology "as the application of knowledge and resources to meet human needs" (p. 20). Mishra and Koehler (2009) expressed this definition in simpler terms, "Technology is all the new stuff that appeared after we were born. The stuff that was around before we arrived on the planet we often take for granted" (p. 15). Thus, technology has been part of society for thousands of years. Humans have constantly sought to create tools that meet various physical, social, financial, and environmental conditions (Fitzgerald, 2002). Mishra and Koehler (2009) argued that everything in the environment that is artificial, is in actuality, a form of technology.

Fitzgerald (2002) explained the ages of technology throughout history are known as the Stone Age, Agricultural Age, Industrial Revolution, Space Age, and Information

Revolution. Each age has provided cultures with resources to survive and thrive in that particular time period. The definition of technology that most people consider today is based on knowledge of machines and computers. Fitzgerald (20020 explained, "A major advance in technology began in the 1880s with the work of famous inventors Thomas Edison, Alexander Graham Bell, and Guglielmo Marconi" (p. 22). These inventors created machines such as the lightbulb, telephone, and telegraph that benefited regular citizens. As the inventions were used, educators began to contemplate the use of the devices in learning (Melillo, 2008).

Technology in the Early 1900s

Technology did not enter classrooms until the early to mid-1900s (Melillo, 2008). Treat (as cited in Melillo, 2008) described teachers in the early 1920s as having the ability to show films and play radio broadcasts and other recordings due to the inventions of Edison and others. Thomas Edison (as cited in Callary, 2008) declared in 1922, "I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks" (p. 15). Educators and inventors envisioned the use of technology even in its earliest forms.

The Visual Instruction Movement took place during 1918-1928 (Johnson, 2008). Greene (as cited in Johnson, 2008) argued, "This nationwide movement aimed to broaden and deepen, by the use of visual aids, our national education in school, church, club and community center" (p. 52). Business leaders began to use images in advertising in effective ways during the 1920s and educators envisioned using that same method to teach core content (Johnson, 2008).

Electronic media came to the forefront in the late 1930s through the Second World War (Johnson, 2008). This was due to the success of training films for soldiers during the war (Ely, 2008). The quickest and most effective way to train soldiers was to show films and thus, the use of more sophisticated film moved into education (Ely, 2008). The 1940s, post-Second World War, moved from the visual instruction movement to audiovisual education (Ely, 2008). Audiovisual education referred to the approach of using films, filmstrips, and recordings to enrich curriculum (Ely, 2008). Computers were in existence during the 1940s; however, the computers were so large they filled entire rooms (Kennedy, 1999). Few people during this time period perceived computers as a possible tool to use in the classroom.

Technology in the Mid 1900s

Technology developed dramatically during the late 1950s and 1960s, which was known as the Space Age. The Space Age was propelled by the Space Race initiative established by President John F. Kennedy in response to the successful launch of a satellite, Sputnik, by the Soviet Union in 1957 (Fitzgerald, 2002). Satellite communications, surveillance, cordless tools, and early computer technology were developed during the Space Age (Fitzgerald, 2002). Because of the focus on science and technology due to the Space Race, devices such as typewriters, calculators, projectors, and audio-visual equipment became common tools of the decade (Melillo, 2008).

The idea of using computers in education began to appear in the 1970s when personal computers became available (Fingal, 2009; Kennedy, 1999). Apple Computers unveiled the Apple II in 1977 (Fingal, 2009). Computers were not viewed as a necessary tool, but more of a luxury. It was not common to have computers in every classroom due

to cost and deficiency of knowledge to operate the computer (Kennedy, 1999). Few

computers were available in schools during the 1970s, but those in use were usually in a

computer lab (Kennedy, 1999). Television was considered the most effective technology

tool at the time, and computers were not viewed as economical or practical for most

schools (Ely, 2008).

Technology in the Late 1900s

The first major push for computer use in schools began in the 1980s. (Fingal,

2009). Moursund (as cited in Fingal, 2009) stated in 1982:

> If our technologically oriented society continues, then eventually computers will
>
> be commonplace. Children will grow up in homes, schools, and neighborhoods in
>
> which everyone uses computers. Computerized information retrieval, word
>
> processing, and problem solving will be as widely used as paper and pencil
>
> techniques are today. (p. 27)

The first educational drill and practice programs were developed for personal computers

during 1981 (Melillo, 2008). The use of computer programs provided teachers and

students with a new method of reviewing, practicing, and enriching skills. Prawd (1996)

concluded most school libraries and classrooms in the early 1980s were equipped with

filmstrip and slide projectors, audio recorders and headphones, televisions, and VCR

players. Computer usage in schools was still accessed mainly in computer labs. Kennedy

(1999) noted only 28% of students in 1984 used a computer at school and only 12% used

computers at home. Prawd (1996) stated, "In 1984, there was one computer for every 75

students" (p. 281). Computers in the late 1980s were used mainly for word processing

and general office applications (Means, 2001). Software was the focus of classroom instructional use in the late 1980s (Means, 2001).

The advancement of the Internet revolutionized computer use in education. Internet use provided students and teachers of the 1990s the opportunity to connect with others around the globe, gather information online, and communicate in new formats such as email (Fingal, 2009). Microsoft company executives released Windows 3.0 for home computers in 1990 (Fingal, 2009). During the early 1990s, President Clinton pursued the goal of connecting every classroom to the Internet (Means, 2001). Kennedy (1999) stated, "Fifty-nine percent of students in 1993 used a computer in school and 28% used a computer at home" (p. 10). By 1994, school leaders reported one computer for every 12 students and 35% of schools had some connections to the Internet (Kennedy, 1999; Prawd, 1996).

Prawd (1996) wrote of a 1995 speech by Bill Gates, owner of Microsoft, in which "Gates described his new concept for education as a stimulating, enriching, educational environment in which all students have access to the world's information through personal computers, and students, educators, parents, and the extended community are connected to one another" (p. 283). The phrase *weblogs* was coined in 1997 by Barger to describe how people could use the Internet to connect and share ideas (Fingal, 2009). By 1998, 89% of schools made the Internet available to students (Kennedy, 1999). The Internet, rather than computer software, became the main source of information and productivity tools in the 1990s (Melillo, 2008).

Technology in the 21ˢᵗ Century

As the new millennium launched in 2000, the fear of Y2K, the coming of the new

millennium, and loss of computer memory and usage was unfounded (Fingal, 2009).

Thus, educators recognized that teaching and learning would progress in the new

millennium due to the rapid increase of new technological tools. Manthey (2000)

proclaimed that technology in classrooms during the 21ˢᵗ Century would be as natural as

picking up a fountain pen and "classrooms will soon include technology as naturally as

the teacher's desk" (p. 31). Dorman (2001) predicted, "Approaches to learning will

become less linear and sequential and more hypermedia-driven; less teacher-centered;

and less instruction-oriented and more discovery-oriented. The teacher will be less

transmitter, more facilitator" (p. 32). Goffe and Sosin (2005) listed the trends in

educational technology for the 21ˢᵗ Century: data projectors, PowerPoint, wireless

handheld PDAs, tablet PCs, electronic interactive whiteboards, and the Internet.

In 2009, Moursund (as cited in Fingal, 2009) expressed the feelings of many

educators in regard to technology integration by the 21ˢᵗ Century:

> From my point of view, progress in the field of IT in education has been quite
>
> slow. I think that progress has been disappointingly slow. However, for the most
>
> part I have been quite optimistic throughout the years. I always feel that the best is
>
> yet to come. Even now, I feel that the field is just barely emerging from infancy. I
>
> look forward to seeing what the future will bring. (p. 29)

Bower (2010) questioned why technology has not helped to improve education, yet it has

made business very productive and transformed industries. Bower (2010) contended that

educators focus on hardware instead of training. Contrary to business industries that

spend one-third of their budget on training, education typically spends only 5% on training (Bower, 2010). As technology continues to advance, educators will need to concentrate on professional development, rather than simply purchasing the latest gadgets (Bower, 2010).

Historical Perspective

During the last hundred years, technology has not only expanded but become part of daily life for most people. Rather than technology simply being a tool for meeting a human need, it has become a way of life. Hooper and Rieber (1995) described two types of technology in education; *product technologies* and *idea technologies*. Product technologies include hardware, machines, software, audio-visual equipment, and other concrete objects (Hooper & Rieber, 1995). Idea technologies are not tangible; rather the technology serves as a resource to help students experience real-world learning (Hooper & Rieber, 1995). Teachers use idea technologies when they understand how to engage learners by making connections, communicating, and creating relevant content using technological resources. Previous generations have focused on product technology, instead of idea technology. The demands of the 21st Century emphasize the need for idea technology in classrooms. Earle (2002) affirmed this philosophy, "From lantern slides to language labs, from closed-circuit television to microcomputers, attempts to improve American schools with modern machines have been something less than a resounding success" (p. 11). The history of instructional technology demonstrates that placing equipment in schools does not guarantee technology integration will take place. Generational differences and perceptions also often contribute to the lack of technology integration success.

Generational Differences

Generations X, Y, and Z

O'Donovan (2009) generalized, "Each generation is formed by its life experience and the reaction to the actions of the generation that preceded it" (p. 68). Allen (2010) referred to present day education at this time as the XYZ Era of Education, or the three generations found in classrooms. Generation X refers to those born from 1960-1979, which makes up a large part of the teaching population (Allen, 2010). Generation Y are students or teachers born from 1980-1995 (Allen, 2010). Finally, Allen (2010) acknowledged Generation Z as those students born from 1996 to the present.

Each generation values different expectations and beliefs. These differences can cause stress within the workplace or classroom. According to Lovely (2008) and Mullan (2008), Traditionalists or Veterans, born 1922-1943, value loyalty, patience, respect, and rules. Mullan (2008) explained, "Baby Boomers, born 1944-1960, place importance on long hours, hard work, recognition, and teamwork" (p. 16). Gen X-ers, born 1960-1980, focus on competence, informality, feedback, and flexibility (Lovely, 2008; Mullan, 2008). Finally, Millenials, born 1980-2000, value collaboration, structure, achievement, and mission as the more important expectations (Mullan, 2008). These generational differences impact classrooms because work ethic, values, and priorities are dissimilar.

Generational Differences and Instruction

Allen (2010) stated, "Today's kids are exposed to high levels of sensory stimulation and learn experientially" (p. 2). Allen (2010) noted that "for most students, their online learning experience isn't replicated in the classroom" (p. 2). In contrast, teachers, those mainly in Generation X era, grew up in a very different environment.

Trilling and Fadel (2009) illustrated the transition from an Industrial Age to a Knowledge Age to exemplify the different environments. Earlier generations were product-driven and today's workers are information and service-driven (Trilling & Fadel, 2009). This creates what is known as the digital divide (Palfrey & Gasser, 2008). Palfrey and Gasser (2008) believed the digital divide is "between the haves and the have nots" (p. 14).

The differences in digital participation by the various generations lead to barriers in technology usage in the classroom for instruction. O'Donovan (2009) contended, "Teachers of different generations view the needs of students differently" (p. 69). Donovan (2009) also noted, "Baby Boomers tend to emphasize mastery of a defined body of knowledge; while Generation X teachers emphasize mastery of transferable skills that constantly redefine knowledge due to the current technology" (p. 69). Allen (2010) believed "we teachers must begin by setting aside our traditional ideas of how things should be done in the classroom and accept that our students really have grown up on a different planet" (p. 6).

The authors of T.H.E. Journal (2009) discussed, *The MetLife Survey of the American Teacher: Past, Present, and Future 2009,* findings that "90% of today's teachers believe technology enhances their ability to teach, even though they are not taking full advantage of the technology" (p. 12). Generational differences were evident in the results: "Sixty-six percent of Generation Y teachers reported they strongly agreed that technology enhances their ability to teach compared to 58% of Generation X teachers and 49% of Baby Boomer teachers" (T.H.E. Journal, 2009, p. 12). While technology may be viewed as a positive tool for teaching, not all teachers take advantage of its possibilities.

Understanding how the current generation thinks and learns can provide teachers with insight for changing instruction to meet different learning needs.

Bridging the Generation Gap

Tapscott (2009) described eight generational norms for the Net Generation, or digital natives. These norms help to understand how learners today interact and think. Tapscott (2009) described the Net Generation Norms:

- They [digital natives] want freedom in everything they do, from freedom of choice to freedom of expression.

- They love to customize, personalize.

- They are the new scrutinizers.

- They look for corporate integrity and openness when deciding what to buy and where to work.

- The Net Gen wants entertainment and play in their work, education, and social life.

- They are the collaboration and relationship generation.

- The Net Gen has a need for speed, and not just in video games.

- They are the innovators. (pp. 34-36)

To address the new norms of learners, Tapscott (2009) proposed an innovative model of education. This model has four key principles, according to Tapscott (2009):

1. Instead of focusing on the teacher, the education system should focus on the student.

2. Instead of lecturing, teachers should interact with students and help them discover for themselves.

3. Instead of delivering a one-size-fits-all form of education, schools should customize the education to fit each child's individual way of learning.

4. Instead of isolating students, schools should encourage them to collaborate.

(p. 122)

These norms differ greatly from the traits of earlier generations. Traditionalists and Baby Boomers tend to focus on content, not the student. The instructional approach of these seasoned educators is often very traditional with limited technology integration. Typically, Generation X teachers emphasize thinking and making real-world connections. This approach tends to be more student-centered. No matter what generation the teacher feels most comfortable, the goal is to help students achieve. Understanding generational differences is important in connecting with the Net Generation or iGeneration.

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Technology and Today's Learners

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The Net Generation, or iGeneration, is surrounded by digital devices and technological tools. Tapscott (2009) suggested that students do not marvel at technology because it is so much of their daily lives. Recognizing the traits and attitudes of today's learners is important to understand how students function within classrooms. It is also important to explore concerns regarding the constant use of digital tools by learners.

Student Technology Use and Attitudes

Li (2007) found students like technology and believed technology could be effective in learning. Mullen and Wedwick (2008) declared, "Being literate no longer only involves being able to read and write. The literate of the twenty-first century must be able to download, upload, rip, burn, chat, save, blog, Skype, IM, and share" (p. 66). Spires et al. (2008) suggested students desire to have school reflect the real-world. Digital

natives realize technology is a major factor in the business world. Students also recognize that technology is constantly changing and they desire to keep up with developments (Spires et al., 2008).

Students use technology mostly for digital music, video games, and cell phones outside of school (Spires et al., 2008). Spires et al. (2008) found the majority of natives feel confident with basic word processing skills and using the Internet to find information. The current challenge facing educators is how to motivate and engage this generation of digital natives. Prensky (as cited in Gewertz, 2007) contended, "School represents the past. After-school is where they [students] are training themselves [students] for the future. The danger is that as school becomes less and less relevant, it becomes more and more of a prison" (p. 26). Rosen (2010) found, "These kids are so technologically advanced that simple adaptations to technology and media in the classroom and in school is boring" (p. 16). Prensky (2010) agreed, "There's so much difference between how students think and how teachers think. Increasingly we're failing to deliver what students need in the ways that they need it" (p. 2). The task of educators is to investigate what students need and what tools are best for meeting those needs. A national survey, Speak Up, 2008, is one resource in which data were gathered regarding student use and attitudes of technology both in school and outside the classroom.

Speak Up Results

The Speak Up National Research Project has been conducting national surveys of teachers, students, parents, and administrators since 2003. Project Tomorrow, a nonprofit organization, sponsors the survey each year (Manzo, 2009). The Speak Up Project (2003) researchers collected data regarding technology usage in classrooms and outside

the learning environment through an online survey. Students in grades K through 12, from all 50 states were surveyed (Manzo, 2009).

Speak Up (2003) investigators surveyed 210,000 students from 3,000 schools (Project Tomorrow, 2010). The results from the original Speak Up survey in 2003 were published in a document, *Voices and Views of Today's Tech-Savvy Students*. The researchers found that technology allowed students to be ultra-communicators (Project Tomorrow, 2010). Email and instant messaging were the students' most popular means of communicating in 2003 (Project Tomorrow, 2010). Sixty-seven percent of secondary students used the Internet to research information for reports. (Project Tomorrow, 2010). The most common complaints of students in 2003 in regard to technology use at school was lack of time, slow Internet access, school filters and firewalls, and not enough computers or non-functioning computers (Project Tomorrow, 2010). The one thing students desired most was the ability to email or instant message at school (Project Tomorrow, 2010).

Speak Up (2009) leaders described learners in their summary report of 2008: "Today's students are early adopters and adapters of new technologies, creating new uses for a myriad of technology products to meet their sophisticated needs" (Project Tomorrow, 2009, p. 1). The Speak Up project researchers identified the nation's students as a "Digital Advance Team" due to the realization that students actually lead the way in how emerging technologies can be used effectively for learning and teaching (Project Tomorrow, 2009) . Speak Up researchers (2009) reported "more than 45% of middle and high school students surveyed say that using technology as part of their regular school

classes is the best way for them to acquire information and media literacy skills" (Project Tomorrow, 2009, p. 5).

Students do not perceive schools as preparing them for jobs in the future. Project Tomorrow (2009) reported, "Only one-third of high school participants in the 2008 survey thought their school was doing a good job of preparing them for the future" (p. 2). However, 56% of administrators believed schools were preparing students for the workforce adequately (Project Tomorrow, 2009). Fletcher (2009) questioned this statistic: "Do the kids perceive a real and serious problem, or are educators and parents more sensible and have a greater understanding of the big picture?" (p. 6). The researchers of Speak Up (2008) commented, "There appears to be a disconnect between how students and educational leaders view the future job market and adequate preparation for the global marketplace" (Project Tomorrow, 2009, p. 8).

Speak Up Project (2008) researchers also noted, "students consistently reported they are inhibited from effectively using computers and the Internet at school due to lack of time and filters or firewalls that block content" (Project Tomorrow, 2009, p. 8). Forty-three percent of sixth through twelfth grade students reported blocked access to websites they needed (Project Tomorrow, 2009). Students felt constrained by rules imposed by teachers that limit their technology use at school (Project Tomorrow, 2009). Manzo (2009) concluded:

> Students are using personal technology tools more readily to study subject matter, collaborate with classmates, and complete assignments than they were several years ago, but they are generally asked to "power down" at school and abandon the electronic resources they rely on for learning outside of class. (p. 10)

Web 2.0 tools and social networking are changing the way students communicate with others. The organization, Project Tomorrow (2009) reported, "Forty percent of high school students and 35% of middle school students stated they updated their profile regularly on a social network site such as Facebook or My Space" (p. 5).The Project Tomorrow organization (2009) explained, "Thirty-eight percent of middle school and high school students acknowledged they share photos, videos, or music online" (p. 5). The preliminary results for the Speak Up (2009) survey reflect many of the same attitudes students possessed in 2008.

Current Speak Up Findings

The initial Speak Up Project (2009) results were published in a document, *Creating Our Future: Students Speak Up about their Vision for 21st Century Learning,* by Project Tomorrow (2010), the nonprofit organization organizing the survey. Project Tomorrow researchers (2010) stated, "The major finding through the years has been the disconnect between the values and aspirations of the nation's students to technology use and the values and aspirations of the less technology-comfortable teachers and administrators" (p. 2). Devaney (2010) reported that the initial findings of the 2009 Speak Up national survey identified the emergence of *free agent learners*.

Devaney (2010) explained, "Free agent learners are students who increasingly take learning into their own hands and use technology to create personalized learning experiences" (p. 1). Devaney (2010) acknowledged, "Researchers found that students are seeking out technology-based learning experiences outside of school because the technology use in school does not mirror the world outside" (p. 1). The Project Tomorrow organization (2010) reported, "Forty percent of middle school students create

or modify digital media. Sixty-five percent of middle school students use digital resources to upload or download videos, podcasts, or photos to the internet" (p. 4). The Project Tomorrow researchers (2010) explained, "Students see the use of relevancy-based digital tools, content and resources as a key to driving learning productivity, not just about engaging students in learning" (p. 18). While technology is part of the fabric of student life, educators are cautious of how to best guide students in this new technology frontier and provide equity of resources.

Concerns Regarding Student Technology Use

The impact of socio-economic status on technology use for students is apparent. In 2005, seventy-seven percent of school children, ages 7 to 17, in higher income households, use a home computer regularly for schoolwork (Azzam, 2006). Azzam (2006) found only 29% of children in the same age group from households earning less than $15,000 used home computers in 2005. Two-parent households are twice as likely to have access to computers as single-parent households (Mason, 2005). A digital divide exists for many students due to income.

Bridging the gap between school use of technology and home use of digital tools is also a struggle for educators. The prolific use of digital tools outside the classroom poses challenges to concepts that must be addressed in the educational setting to assist students in succeeding in 21st century skills (Ferriter, 2009). Ferriter (2009) cautioned even though students have no trouble connecting with others using digital resources, no one has taught them how to use these tools for meaningful personal growth.

Digital natives have developed certain coping strategies to prevent information overload (Gasser & Palfrey, 2009). Gasser and Palfrey (2009) discussed multitasking as a

common issue students experience. Multitasking is accomplished through parallel

processing, when two things are completed at the same time, or task-switching, when one

rapidly changes from one task to another (Gasser & Palfrey, 2009). Gasser and Palfrey

(2009) explained, "Students typically use more than one digital tool at the same time or

abruptly switch from one task to another without completion of the original task until

much later" (2009, p. 17). Gasser and Palfrey (2009) recommended embracing

multitasking and providing students with understanding of how to best manage

multitasking. An understanding of the phenomenon is important for educators. Gasser

and Palfrey (2009) generalized the understandings of multitasking:

- Multitasking does not render learning impossible. It does not even necessarily

  make it more difficult to accomplish tasks. However, we can safely conclude

  that task-switching in particular increases the amount of time needed to finish

  a task.

- Multitasking is likely to change learning qualitatively by making the learner

  rely on different memory systems that vary in flexibility when it comes to the

  use of knowledge.

- The loss of attention and the time spent switching from task to task is likely to

  have an adverse effect on digital natives' ability to learn complex new facts

  and concepts. (p. 18)

Technology continues to change the world and learning environments. Tapscott (2009)

explained, "Young people have a natural affinity for technology that seems uncanny.

They instinctively turn first to the Net to communicate, understand, learn, find, and do

many things" (p. 9). This affinity for technology encourages students to explore new avenues of technology, such as social networking.

Technology Trends and Students

Digital natives currently connect with other people socially through social networking sites (Taranto & Abbondanza, 2009). DiScipio (2008) described the impact of social networking, "Students are leveraging personal social networking sites, such as Club Penguin, My Space, and Facebook, to connect and communicate with their peers before and after school" (p. 1). The students' constant immersion in technology creates a need for interactivity and multi-tasking. Prensky (2001a) surmised, "It generally isn't that digital natives can't pay attention, it's that they choose not to" (p. 4). Pink (2009) proposed that intrinsic motivation of digital natives is composed of three elements:

1. Autonomy is the desire to direct our own lives.

2. Mastery is the urge to get better and better at something that matters.

3. Purpose is the yearning to do what we do in the service of something larger than ourselves. (p. 204)

Students are interested in projects and learning that have relevance to them. This requires engagement, or interactivity, with learning. Pink (2009) declared, "Relevance should be thought of as the fourth R: reading, writing, arithmetic, and relevance" (p. 179). Focusing on relevance and engagement requires a shift in educational pedagogy and practice. Richardson (2008) described this shift as the first in history that is being driven by children due to their understanding of technology. Richardson (2008) suggested, "Educators will need to move from the concept of building knowledge inventory in the minds of students to an approach that requires students to own their own

learning processes and pursue learning, based on their needs of the moment" (p. 16).

Technology integration in the classroom is dependent upon the understanding of digital

natives and the digital tools available.

Technology Integration in the Classroom

Technology integration in the classroom requires more than purchasing and

installing new computers (Cuban, 2001). Learning does not take place just because

technological tools are present. Best instructional practices and quality instruction are

necessary to impact student achievement (Marzano, 2009). Exploring how students learn,

best practices, and effective integrated technology programs or tools makes clear the

challenges educators face daily in attempting to weave technology into instruction.

The Brain and Learning

An understanding of how technology impacts learning can be found in brain

research. Prensky (2001b) proposed the brain of the digital native is rewired by a result of

the brain's neuroplasticity. Neuroplasticity refers to the brain's practice of reorganizing

itself (Prensky, 2001b). The process of reorganizing is difficult and can only take place

after many repetitions, such as when playing video games. (Prensky, 2001b). Due to the

nature of technology, students involved with video gaming are reorganizing their brains,

or rewiring.

Rosen (as cited in Jayson, 2010) affirmed that researchers are examining the

multitasking of today's students as an example of the possible rewiring. Rosen (as cited

in Jayson, 2010) explained, "They [students] should be distracted and should perform

more poorly than they do. But findings show teens survive distractions much better than

we would predict by their age and their brain development" (p. 1). Palfrey and Glasser

(2008) suggested that digital natives are used to receiving information in bursts, such as how television engages its viewers.

Tapscott (2009) explained that students between the ages of 12 and 20 are immersed in technology. Today's students are active users of technology, not just passive watchers. During the teenage years, the brain begins to prune and reduce connections among brain cells (Tapscott, 2009). The impact of this immersion and pruning process results in students tending to be more visual than their parents. Tapscott (2009) reported that the Net Generation, also known as digital natives, is equipped with mental skills such as scanning and quick mental switching. Faced with an incredible amount of information at once, the Net Generation uses visual skills and mental switching skills to sort through the content more easily.

The work of Jensen (2008) supported many of Prensky and Tapscott's findings in regard to brain development. Jensen (2008) reported that the brain has five major attributes:

1. The human brain can and does grow neurons.

2. Social conditions influence our brains in ways we didn't know before.

3. The ability of the brain to rewire and remap itself by means of neuroplasticity is profound.

4. Stress affects attendance, memory, social skills, and cognition.

5. The discovery that environments alter our brains is profound. (p. 36)

Along with neuroplasticity, or the process of reorganizing, Jensen (2008) noted the influence social conditions have on brain development. Digital natives currently connect with other people socially through social networking sites (Taranto & Abbondanza,

2009). Educators wonder how this new age of socializing will affect learning and brain development. Educators also seek the most effective approach to technology integration. The educational theory of constructivism has provided a solid foundation for many teachers.

Constructivism

Abbott and Ryan (1999) defined the basic premise of constructivism: "Constructivism holds that learning is essentially active. A person learning something new brings to that experience all of his or her previous knowledge and current mental patterns. As a result, learning is neither passive nor simply objective" (para. 8). Kerwood (2009) explained:

> Students learn by actively connecting new understanding to previous understanding. Learners develop knowledge by actively engaging in activities and experiences and through social interaction and collaboration, followed by reflection, as an essential part of learning. When learners encounter something new, they must reconcile that new experience with what they already know. If the new understanding does not fit with their prior knowledge and experiences, then they must change their existing understanding or discard the new knowledge. In this manner, learners actively create knowledge. (p. 6)

Neo and Neo (2009) purposed that during constructivist learning, the emphasis is on learning, student-centered learning environments, and solving problems by being active participants in the learning process. Neo and Neo (2009) described the constructivist learning environment as "demanding a meaningful and authentic context for social and collaborative activities" (p. 255). Rakes, Fields, and Cox (2006) concluded

constructivism increased authenticity in the classroom. Constructivism emphasizes higher order thinking, thus increasing student achievement. Rakes et al. (2006) maintained that emphasis on advanced reasoning skills in constructivist teaching practices promotes higher student performance while students continue to learn basic facts and skills.

Although constructivism began in the 1930s with the work of Dewey, other educational theorists, such as Piaget, Vygotsky, and Gardner have built their philosophies from the constructivist theory (Fogarty, 1999). The constructivist theory is especially pertinent in the digital age. Learners must actively engage in reconciling new experiences with past learning (Palfrey & Gasser, 2008). Digital natives easily translate new technologies to similar tools (Palfrey & Gasser, 2008). Neo and Neo (2009) discovered that students experience a high level of motivation and self-esteem when using technology, such as when creating multimedia projects.

Digital immigrants often struggle with distinguishing the similarities between the digital tools (Palfrey & Gasser, 2008). Tapscott (2009) observed although Net Gen students assimilate technology, adults must accommodate it. Accomodating is a more difficult process. Beyers (2009) affirmed Tapscott's beliefs:

Teachers are having to adapt to these changes through a process of upgrading their own skills to empower them to become better facilitators. By doing so they are able to unleash the innate potential of the learners entrusted to them. (p. 226)

Judson (2006) acknowledged, "Teachers who readily integrate technology into their instruction are more likely to possess contructivist teaching styles" (p. 581).

In 1998, Adams and Burns (as cited in Kerwood, 2009) identified six principles of constructivism that complement the process of learning:

- learners each bring unique prior knowledge, experiences and beliefs to a learning situation;

- learning is internally controlled and mediated;

- learners construct knowledge in multiple ways through a variety of tools, resources, experiences, and contexts;

- learning is a process of accommodation, assimilation, or rejection that constructs new conceptual structures, meaningful representations, or mental models;

- learning is both an active and reflective process; and

- social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning. (p. 7)

Constructivism provides a framework for students and teachers to explore new technologies while integrating required content standards. Judson (2006) surmised, "The utilization of technology is not a goal of constructivism, yet it [constructivism] may enable students to construct personal meaning, learn from one another, learn from experts, and create unique interpretations" (p. 592). Judson (2006) proclaimed, "Technology is not a mechanism that enables constructivism, it is a device best used at the moment when it enables students to gain deeper understanding" (p. 593). The theory of constructivism integrated with technology is a basic principle in a successful classroom technology approach called eMINTS.

eMINTS

eMINTS is an acronym defining a program entitled "enhancing Missouri's Instructional Networked Teaching Strategies" (eMINTS, 2010, para. 4). The directors of

eMINTS (2010) described the program, "eMINTS is a collaborative education program sponsored by the Missouri Department of Elementary and Secondary Education and the Missouri Department of Higher Education" (para. 4). An eMINTS classroom includes technology, such as 12 computers, a teacher computer, a Smart Board interactive whiteboard, printers, and a digital camera (eMINTS, 2010). However, the priority in an eMINTS classroom is quality instruction. The purpose of eMINTS, according to the official site (eMINTS, 2010), is, "Teachers facilitate student learning through the use of essential questions that stimulate thinking; build curiosity, create connections, and generate long lasting knowledge through issues that matter to students" (para. 6). This approach correlates with the constructivist model.

The eMINTS program is an instructional model rather than a curriculum-based approach. The eMINTS directors explained, "The components of the eMINTS instructional model are inquiry-based learning, high-quality lesson design, classroom community, and powered by technology" (para. 12). Inquiry-based learning in the eMINTS model incorporates inquiry and constructivist approaches (eMINTS, 2010). This causes students to ask and reflect on higher order questions and find the answers for themselves. High-quality lesson design involves teachers using inquiry to provide real-life and meaningful learning (eMINTS, 2010). Classroom community is built in an eMINTS classroom because of the continuous use of cooperative learning and collaborative work (eMINTS, 2010). The final piece of the instructional model is powered by technology. Even though eMINTS is often thought of as a technology-infused classroom, technology is actually viewed as a tool to be used in quality instruction (eMINTS, 2010). Web 2.0 tools, specially selected software and tools, and

quality equipment are used to provide a variety of resources for students to create, learn, and explore the world (eMINTS, 2010). eMINTS is model for using constructivism infused with technology.

Interactive Whiteboards

Marzano (2009) described an interactive whiteboard as "a large display that connects to a computer and projector. The projector displays the computer's desktop onto the board's surface, where users control the computer with a pen, finger, or other device" (p. 80). Doe (2010) explained different companies produce whiteboard technology. Smart Board, Star Board, Mimio, and Activ Boards are some of the most popular in schools (Doe, 2010). The purpose of the board is to provide interactivity with content. Thus, educators are willing to purchase interactive whiteboards in hopes of increasing student achievement.

Marzano (2009) found three important features for the use of whiteboards: learner-response devices, visuals, and reinforcers. For students to truly benefit from the use of interactive whiteboards, Marzano suggested teachers use learner-response devices which are handheld voting devices to enter responses to questions. This provides students with immediate feedback which leads to higher student gains (Pitler, Hubbell, Kuhn, & Malenoski, 2007). Marzano also encouraged the use of visuals, such as pictures, video clips, graphs, and charts to engage learners. The constructivist idea of learners creating their own questions is developed when students examine images and then construct meaning (Pitler et al., 2007). Finally, Marzano discussed the use of reinforcers, or applications, that signal an answer is correct or displaying information in a unique way. Students achieved a 31 percentile point gain when using interactive whiteboard lessons

(Marzano, 2009). Pitler et al. (2007) concluded that students learn when they are able to quickly correct misconceptions and have positive reinforcement of their answers. Constructing learning for oneself is key to achievement. Constructivism, through instructional models or technology tools, assists learners in the classroom; however, the reality is that many teachers do not make use of these best practices.

Vision for Classrooms and Technology

Tapscott (2009) noted, "The use of technology in the classroom has been increasing over the last 20 years" (p. 17). Tapscott (2009) reported, "100 percent of American schools provide Internet access and it is estimated that there is a computer for every four schoolchildren in America" (p. 17). It has been a slow and constantly growing process. Digital natives do not see technology as something new, but rather like the air that surrounds them in the atmosphere (Tapscott, 2009). Technology is present, yet not necessarily remarkable to this generation because they have assimilated to its use.

Technology in the classroom is no longer used simply for drill and practice. Technology is used to bring the world into the classroom. Nussbaum-Beach (2008) proposed that technology should be used for collaboration with other classrooms and people. Tools such as blogs, podcasts, digital video, and wikis are used to communicate with others and share learning (Nussbaum-Beach, 2008). Nussbaum-Beach (2008) stated, "Teachers may not serve as dispensers of information and ideas; rather they will continue to create learning opportunities that help students develop skills and motivation" (p. 18).

The use of technology will not increase student achievement or motivation if educators do not focus on the essential learning functions of technology. Boss and Krauss (2007) "outlined essential learning functions for technology as ubiquity; deep learning;

making things visable and discussable; expressing ourselves; sharing ideas and building community; collaboration, research, and project management; and reflection and iteration" (p. 13). These functions are present when using quality web resources. Students are able to share, collaborate, research, and reflect. All of these functions keep students engaged in the learning process. Richardson (2008) stated, "One of the biggest challenges educators face right now is figuring out how to help students create, navigate, and grow the powerful, individualized networks of learning that bloom on the Web and helping them do this effectively, ethically, and safely" (pp. 17-18).

Technology is no longer used simply for students to gain or manage information; moreover, technology offers a myriad number of possibilities for learning and participating. Palfrey and Gasser (2008) described the process of learning: "Digital natives now gather information through a multi-step process that involves grazing, a deep dive, and a feedback loop" (p. 32). Many adults are critical of today's learners because students do not learn in the same way as earlier generations; however, Palfrey and Gasser (2008) found that digital natives have a new process of gaining information. Kolikant (2009) surmised that digital natives view the Internet as much more useful than books.

Students first *graze* for information by visiting websites, receiving text messages, or information on social networking sites (Palfrey & Gasser, 2008). The digital native, or student, is intrigued by this activity and visits multiple sources online, recognizes the focus of the information, and then *deep dives* (Palfrey & Gasser, 2008). To deep dive means to seek out trustworthy information from reputable sources (Palfrey & Gasser, 2008). A unique step in this process is the *feedback loop* in which digital natives take learning a step farther by sharing what they know with others (Palfrey & Gasser, 2008).

Blogs, wikis, websites, social networking sites, and text messaging become avenues of passing on information to friends, families, and others with similar interests (Tapscott, 2009). This makes the learning of the digital learner much different from previous generations. Today's tools allow students to be very sophisticated in sharing what they have learned or their passions (Palfrey & Gasser, 2008).

Nussbaum-Beach (2008) stated, "If we want to remain relevant in the lives of students, then we must use strategies and materials that fit the learning styles of the digital native" (p. 18). One fact remains true of learners; each one is different and has different needs. Educators must use the technology common to students and integrate that with relevant content. Williams (2008) suggested that school leaders embrace new technologies to bridge the gap between teachers and students. Williams (2008) also acknowledged, "Educators should learn more about Web tools and how to use them to enhance learning" (p. 224). This will allow for differentiation of instruction, addressing learning styles, and developing multiple intelligences of digital natives. The Speak Up national survey results for 2008 and 2009 provided educators with possible reforms in instructional approaches.

Suggestions for Teachers Regarding Technology Use

The Speak Up (2009) national survey data was published to assist leaders and policy makers in progressing forward with technology integration in schools. Project Tomorrow (2010) representatives recommended the following practices:

- Un-tether learning and leverage mobile devices to extend learning beyond the school day and meet all learners in their own world.

- Create new interactive, participatory learning spaces using such tools as online classes, gaming and simulations, online tutors and virtual reality environments.

- Incorporate Web 2.0 tools into daily instruction, especially those that develop collaborative or social-based learning and provide unique opportunities for students to be content developers.

- Expand digital resources in the classroom to add context and relevancy to learning experiences through new media tools.

- Get beyond the classroom walls and make learning truly experiential, such as using high-tech science instrumentation and creating podcasts with content experts. (p. 8)

These suggestions alert educators to use technology as an important resource in learning, not just a novelty or luxury item.

Project Tomorrow (2010) researchers identified "three elements that offer potential for new teaching approaches based on the initial 2009 Speak Up Project survey results: social-based learning, un-tethered learning, and digitally-rich learning" (p. 3). Project Tomorrow (2010) representatives reported, "Students are doing more creation and manipulation of digital media in their personal lives than at school" (Project Tomorrow, 2010, p. 5). Devaney noted, "For the first time in the Speak Up survey history, students reported their number one obstacle in using technology was not being able to use their own cell phone, smart phone, or MP3 player while at school, rather than remarking about school filters and firewalls as the largest obstacle" (2010, p. 2).

Devaney (2010) suggested, "Social-based learning suggests that students want to use collaboration and communication tools to assist in their learning" (p. 2). Project Tomorrow (2010) researchers discovered "65% of middle school age students use instant messaging, email, text messaging, and social networks to communicate with others" (p. 5). Devaney (2010) summarized:

Fifty-one percent of middle school age students reported using these tools outside of the school day to communicate with friends, complete schoolwork, and communicate with teachers; however, a major obstacle is the inability to access personal communication accounts or use of electronic messages during the school day. (p. 3)

Project Tomorrow (2010) authors cautioned that despite the positive attitudes toward mobile devices such as cell phones, smart phones, and MP3 players; many teachers and administrators are unsure of their use in the classroom. Reasons for not using mobile devices at school include distraction, cheating, lack of curriculum to support the usage, and the inequity of not all students having access to the devices (Project Tomorrow, 2010).

Un-tethered learning is similar to social-based learning in that students need access to mobile devices (Devaney, 2010). Project Tomorrow (2010) authors defined "un-tethered learning as technology-enabled learning experiences that transcend the classroom walls and are not limited by resource constraints, traditional funding streams, geography, community assets or even teacher knowledge or skills" (p. 3). Students desire access to online resources, such as online textbooks and explore learning at their own pace (Project Tomorrow, 2010). Using netbooks, laptops, iPods, Flip video cameras,

Smart phones, and digital readers allow students to connect to reality-based context instead of just classroom experience (Project Tomorrow, 2010).

Solutions to the obstacles faced by social-based learning and un-tethered learning were provided by students in the Speak Up 2009 findings as reported by Project Tomorrow (2010):

- Let me use my own cell phone, smart phone, or mp3 player.

- Let me use my own laptop or netbook.

- Provide me with unlimited Internet access throughout the school.

- Provide access to my social networking sites.

- Provide tools to help me communicate with my classmates. (p. 10)

Districts face major challenges when implementing such solutions. Security and safety are the major reasons for prohibiting or blocking certain tools (Project Tomorrow, 2010). Administrators, legislators, teachers, parents, and community leaders will need to embrace this new vision of learning in order to overcome the obstacles of the past (Project Tomorrow, 2010).

The final discussion point of the Speak Up 2009 findings is digitally-rich learning (Devaney, 2010). Project Tomorrow (2010) researchers reported, "Forty percent of middle school students create or modify digital media and sixty-five percent of middle school students use digital resources to upload or download videos, podcasts, or photos to the Internet" (Project Tomorrow, 2010, p. 6). Project Tomorrow (2010) researchers explained, "Students see the use of relevancy-based digital tools, content and resources as a key to driving learning productivity, not just about engaging students in learning" (p. 18). Project Tomorrow researchers added, "Students today are immersed in technology

and are sophisticated in their use of the digital tools" (2010, p. 18). A disconnect exists between the use of these digital media resources in and out of school (Project Tomorrow, 2010). Project Tomorrow (2010) authors suggested, "The use of games and online textbooks within learning are examples of how digitally-rich learning can be brought into the classroom (p. 8). Preparing teachers for the classroom and providing continual high-quality staff development are necessary to put technology integration strategies into practice.

High Quality Staff Development

To increase student achievement, teachers must not only understand the essential functions of technology, but receive appropriate professional development. Levin and Wadmany (2008) studied many factors that hinder effective use of technology in the classroom: "lack of convenient access to computers, inadequate infrastructure, poor planning for the use of technology, limited or inadequate professional development, lack of time, lack of ongoing support, and poor leadership knowledge" (p. 233). Hoyer (2010) surmised, "teachers need to understand the differences in technology usage between themselves and students, and even though educators persistently think of technology as new, it has been in schools for more than twenty years" (p. 1). Training should involve how to use the technology and research-based instructional practices. Technology is no longer used simply for students to gain or manage information, but it opens a whole new world of possibilities for learning and participating. Incorporating national standards, understanding teacher efficacy, and instituting effective professional development strategies will help teachers acclimate and integrate technology effectively.

Standards and Professional Development

In 2001, the National Staff Development Council (NSDC) established context, process, and content standards to improve the learning of all students. These standards are still used to guide professional development. The context and process standards for professional development involve learning communities, leadership, and collaboration and require teachers and leaders to use data to determine learning goals for adults (NSDC, 2001). The content standards for staff development, focus on providing equity for all students and enriching teaching practices to produce quality teaching (NSDC, 2001). Hirsh (2006) explained, "effective professional development is not about meeting the requirements of a list, it is about carefully considering and planning according to desired outcomes and standards that will contribute to that success" (p. 59).

The perfect storm of student achievement, according to Marzano (2009), is when a teacher is trained to use the technology, has used it for two years, and has used it 75% of the time. This can produce a 29 percentile gain in scores (Wolpert, 2009). Teachers need time to learn and incorporate technology into the classroom, which is an ongoing process due to the nature of technology. Wolf (as cited in Pascopella, 2008) warned "professional development must shift from one-time, stand-alone workshops to ongoing learning for teachers and administrators" (p. 12). Technology fluency for teachers is defined by Plair (2008) as knowing when and how to use technology tools to enhance learning. Providing teachers with new tools is useless without high quality professional development that helps instructors understand how to use the technology effectively with their content.

Hooper and Rieber (1999) concluded, "there are five basic phases of teachers' use of technology: familiarization, utilization, integration, reorientation, and evolution" (p. 16). Becoming acquainted with the technology is the first step to using the technology in a new way for a new purpose. Often teachers have been slow to progress through these stages.

Familiarization is an initial exposure to a technology concept or tool, such as a one-time workshop experience (Hooper & Rieber, 1999). The utilization phase occurs when teachers experiment with a technology in the classroom (Hooper & Rieber, 1999). This is a critical phase because many teachers will reject the innovation if the technology does not work. The integration phase is more complicated. A teacher consciously decides to embed the technology within the content instruction during the integration phase (Hooper & Rieber, 1999).

Reorientation is the fourth phase of technology use. Reorientation requires teachers to take a new role as facilitator. Hooper and Rieber (1999) explained, "In this phase the learner becomes the subject rather than the object of the education" (p. 157). Finally, evolution is the last phase of teacher growth. Educators are reminded that one must constantly change and adapt to remain effective (Hooper & Rieber, 1999). Educators must understand that there is never finality to technology needs. Teachers must constantly evolve in order to help students succeed academically. Teachers' beliefs of their abilities greatly impacts change and growth. Teacher efficacy has much bearing on attitudes toward technology training and integration.

Teacher Efficacy and Technology

Hoy (as cited in Protheroe, 2008) defined teacher efficacy as "teachers'

confidence in their ability to promote students' learning" (p. 42). Bandura (as cited in

Lumpe & Chambers, 2001) approached efficacy as "beliefs in one's capabilities to

organize and execute the courses of action required to produce given attainments" (p. 94).

Technology integration, or lack of integration, can be based somewhat on teacher

efficacy (Lumpe & Chambers, 2001). Teachers must believe technology can and will

produce student learning, or attainment of goals, to fully implement technology tools in

the classroom (Hoy, as cited in Protheroe, 2008). Jerald (as cited in Protheroe, 2008)

described behaviors teachers possess when reaching a high confidence level while using

technology:

- Teachers tend to exhibit greater levels of planning and organization;

- Teachers are more open to new ideas and are more willing to experiment with
  new methods to better meet the needs of their students;

- Teachers are more persistent and resilient when things do not go smoothly;

- Teachers are less critical of students when they make errors; and

- Teachers are less inclined to refer a difficult student to special education. (p.
  43)

Lumpe and Chambers (2008) discovered teachers had higher efficacy if access to

technology resources and professional development were believed to be available. Lumpe

and Chambers (2008) also discussed the possibility of colleagues impacting the efficacy

of teachers to the benefits of technology in the classroom. Protheroe (2008) emphasized

the importance of teachers believing they can teach all students in ways that enable the

students to meet high standards. Technology integration, 21st century skills, technology proficiency tests, and the National Technology plan are designed to meet students' current learning needs. Teacher efficacy greatly impacts these goals (Ferriter, 2009). Effective professional development approaches are needed to assist teachers in their professional growth.

Effective Professional Development Approaches

Prensky (2005) noted students move at a much faster pace and are better able to evolve more quickly. Teachers use technology more quickly when they are shown how the technology can impact their content. This is achieved by providing teachers with concrete activities and lessons that integrate technology effectively (Plair, 2008). Hoyer (2010) suggested, "Educators must reframe what they teach so that students understand the significance of what they learn" (p. 2). Hoyer (2010) proposed teachers should ask the following questions about instruction in today's world:

- Do the educational resources provided fit the needs and preferences of today's learners?

- Will linear content give way to simulations, games, and collaboration?

- Do students' desires for group learning and activities imply rethinking the configuration and use of space in classrooms and libraries?

- What is the material basis of digital literacy?

- What is different in a digital age?

- What are kids doing already and what could they be doing better, and more responsibly, if we learned how to teach them differently? (p. 2)

Bridging the gap and creating change will result as educators focus on instruction and how it should be presented to digital natives (Hoyer, 2010).

Judson (2006) stated, "Professional development goals should focus on the rationale of contructivism, not on forcing the use of technology" (p. 592). Equipping today's teachers with skills and tools to meet student needs will require support and time. Levin and Wadmany (2008) suggested that "professional development experiences apply personal and social constructivist-based learning principles even if this [providing professional development experiences] requires a slower pace and more heterogeneous patterns of professional development" (p. 258). Focusing on each teacher's individual professional development is key when discussing technology integration. The learning curve is wide for teachers and technology usage; therefore, high quality professional development opportunities that include interaction with educational specialists, student experts, learning resources, along with a commitment to long-term sustained training are necessary to bring about change (Levin & Wadmany, 2008). Ongoing professional development could include new formats such as: online portals, online learning communities, videos, podcasts, technology instructional coaches, and social networking (Pascopella, 2008).

Plair (2008) suggested the use of a knowledge broker to train teachers in technology integration. A knowledge broker shares resources, skills, and lessons with teachers in the form of a coach and specialist. Plair (2008) identified five important knowledge broker roles in professional development:

1. Harbinger of Innovation stays current with the latest innovations and passes the knowledge on to teachers;

2. Master of Strategies and Techniques learns to use technology resources and shortens the amount of time it will take teachers to learn new ideas;

3. Teaching Artists use teaching skills to help teach assimilate new technology by breaking down the process into everyday terms;

4. Johnny-On-the-Spot is available to assist teachers when they attempt new technologies and answer trouble shooting questions in real time; and

5. Catalyst for Change and Unity leads teachers in technology rich experiences that spread to other classrooms. (pp. 72-73)

High quality professional development for technology integration reaches far beyond faculty meetings and workshops. Teachers must be given sustained, on-going training with a support system in place. Learning technology takes time and teachers must be provided with opportunities to develop their skills.

21st Century Skills

It is evident that the world is continually changing due to technology. Parents and educators are challenged to prepare this generation to participate in a global economy. In a nationwide poll, conducted by Hart Research Associates for the Partnership for 21st Century Skills (2007), determined, "Ninety percent of voters felt teaching students 21st century skills, such as critical thinking, problem-solving skills, computer and technology skills, communication, and self-direction skills was important to the country's future economic success" (p. 1). Vockley (2007) explained, "The poll also revealed 80% of voters believed the kind of skills students need to learn to be prepared for the jobs of the 21st century is different from what was needed 20 years ago" (p. 1). The Partnership for

21st Century Skills has organized and publicized the idea of teaching real-world skills to this generation.

Partnership for 21st Century Skills 2009

The Partnership for 21st Century Skills is an organization focused on integrating 21st Century skills into education (Johnson, 2009). Johnson (2009) explained, "The 21st Century Framework is an outline of the skills, knowledge, and expertise students will need to succeed in their personal and professional lives" (p. 11). Current technologies have spurred the need for standards to assist students in succeeding in the digital age. According to the Partnership for 21st Century Skills organization (2009) student outcomes for the new global economy included:

- Learning and Innovation Skills: creativity and innovation, critical thinking, and problem solving;

- Information, Media and Technology Skills;

- Core Subjects; and

- Life and Career Skills: flexibility, adaptability, leadership, and responsibility. (p. 2)

In addition, the Partnership for 21st Century Skills advocacy group is encouraging educators and students to focus on skills and traits necessary for success in the future (DiScipio, 2008).

21st Century Skills and the Workforce

Employers are perhaps more aware of the need for 21st century skills than educators. Hart Research Associates (2007), on behalf of the Association of American Colleges and Universities, interviewed employers and recent college graduates to gain

information regarding skills needed to be successful in today's worldwide marketplace. Hart Associates (2007) reported 63% of business executives agreed students do not have the skills necessary to thrive in the global market. Hart Associates (2007) stated, "Business executives place the greatest emphasis on teamwork skills, critical thinking, analytical reasoning skills, and communication skills when evaluating the skills of potential new hires" (p. 2). The impetus for 21st century skills is more than a new set of standards for schools; it is the set of skills necessary for future economic growth of the nation.

Educators struggle with integration of new technological tools, social networking, and constructivist learning experiences. DiScipio (2008) found "The key to 21st century learning comes from the combination of innovative pedagogy and a global community with the networking tools that students are using outside the classroom" (p. 3). No longer will learning be a set body of knowledge, but rather an ongoing process of assimilating new information. Gee and Levine (2009) believed, "Due to students living in an innovation-based global age, teachers are required to retool foundational literacy skills and link them with other competencies such as the 21st Century Skills" (p. 5). DiScipio (2008) suggested teachers and administrators should consider the following questions regarding technology and the 21st century skills:

- How are you preparing your students for working in a global marketplace?
- How are you using technology to build collaborative skills and creativity among your students?
- How are you creating global digital citizens?

- How are you building learning experiences that connect learning to "real life"

  and encourage independent exploration?

- How can you teach 21st century skills in economically disadvantaged

  communities? (p. 1)

Employers, educators, parents, and students must listen to each other and learn

from one another to meet the challenges of the global economy and technological world.

Academics must include more than subject content. Rotherham and Willingham (2009)

suggested, "Students will need life and career skills, information, media, and technology

skills to compete and be successful" (p. 20). Rotherham and Willingham (2009) warned,

"Without better curriculum, better teaching, and better tests, the emphasis on 21st Century

skills will be a superficial one that will sacrifice long-term gains for the appearance of

short-term progress" (p. 20). Due to the emphasis on 21st century skills, the United States

Department of Education [USDOE] issued a new national technology initiative that

emphasizes the use of technology.

National Technology Initiative

In response to the call for 21st century skills, the USDOE released a National

Educational Technology Plan proposal in March, 2010 (Duncan, 2010). The purpose of

the plan is to encourage educators to teach 21st century learners effectively. Duncan

(2010) stated, "I challenge you to put your talent and ingenuity to work to equip 21st

century students with 21st Century skills" (Duncan, 2010). The National Technology Plan

authors (2010) explained, "Students must be fully engaged and that will require the use of

technology tools in the classroom that mirror the tools used outside the school walls (p.

9). Duncan (2010) asserted that schools must change the instructional content, learning

experiences offered, teaching methods, and assessments to keep up with the 21st century. The authors of the National Educational Technology Plan (2010) based the goals on the following assumptions:

- Most of the failure of our education system stems from a failure to engage students.

- What students need to learn and what we know about how they learn have changed; therefore, the learning experiences we provide should change.

- How we assess learning focuses too much on what has been learned after the fact and not enough on improving learning in the moment.

- We miss a huge opportunity to improve our entire education system when we gather student-learning data in silos and fail to integrate it and make it broadly available to decision-makers at all levels of our education system.

- Learning depends on effective teaching, and we need to expand our view of teaching to include extended teams of educators with different roles who collaborate across time and distance and use technology resources and tools that can augment human talent.

- Making engaging learning experiences and resources available to all learners anytime and anywhere will require state-of-the-art technology and specialized people, processes and tools.

- Education can learn much from industry about leveraging technology to continuously improve learning outcomes while increasing the productivity of our education system at all levels.

- Just as in health, energy, and defense, the federal government has an important role to play in funding and coordinating some of the more far-reaching research and development challenges associated with leveraging technology in education. (p. 5)

Duncan (2010) stated, "The NCLB mandates will be replaced with a proposal focusing on high standards that prepare students for success in college and careers; emphasizes goals and outcomes, not inputs; and rewards excellence (p. 5). The 21st century model used in the National Technology Plan is built on the following principles: learning, assessment, teaching, infrastructure, and productivity (USDOE, 2010).

Foundational Ideas and Goals

The 21st century model used in the proposed National Technology Plan builds on the first foundation of" providing engaging and empowering learning experiences for all learners" (National Technology Plan, 2010, p. vi) Students outside of school are pursuing their passions through social networking and other technologies (USDOE, 2010). The writers of the document envisioned using current technologies, typically used outside the classroom, in the classrooms to engage today's learners (USDOE, 2010). The National Technology Plan (2010) focused on using "a core set of standards-based concepts and competencies for which teachers should provide engaging, individualized learning that integrates current technology tools" (p. 23).

The National Technology Plan proposal provides assessment as the second foundation for the proposal (Duncan, 2010). The writers of the National Technology Plan (2010) stated, "Technology-based assessments along with learning systems can be used formatively to diagnose and modify the conditions of learning and instructional

practices while at the same time determining what students have learned for grading and accountability purposes" (p. vii). The goal of the new educational initiative is for continuous improvement (USDOE, 2010).

Teaching, the third foundation of the plan, will be transformed as a result of the current proposal by the USDOE (2010). Teaching will be seen as a connected activity, rather than an isolated task (USDOE, 2010). Technology will provide the tools to make data and professional development accessible at any time to improve teaching strategies (Duncan, 2010). Teachers will be encouraged to collaborate with peers and be part of professional development that is collaborative, coherent, and continuous (USDOE, 2010).

The fourth foundation of the National Technology Plan is to improve infrastructure (Duncan, 2010). Duncan (2010) defined, " Infrastructure includes people, processes, learning resources, policies, and sustainable models for continuous improvement in addition to broadband connectivity, servers, software, management systems, and administration tools" (p. ix). Duncan (2010) contended that the Federal Communications Commission was working towards providing broadband connectivity for all students, in all areas, school, home, and community. Educators and students will need full support of all infrastructure components in order to excel.

Productivity is the final foundation of the proposed National Technology Plan (Duncan, 2010). Technology will be used to increase productivity, save time and money, and individualize learning for students (USDOE, 2010). Duncan (2010) declared the goal of productivity is "about improving learning outcomes while managing costs" (p. 3). The National Technology Plan (2010) authors suggested, "Technology can be used not only for student engagement, but to increase efficiency during the learning process and give an

accurate view of performance whether that be academic or financial" (p. vii). Duncan (2010) summarized the purpose of the National Technology Plan, "We want to raise creative, resourceful thinkers. We want to nurture informed citizens, effective problem-solvers, ground-breaking pioneers and visionary leaders to develop life-long learners who are masters of today's information tools, and technologies" (p. 3).

Davis (2010) declared, "Collaboration is essential in making the ed-tech plan a success" (p. 1). The National Technology Plan must include input from private support such as technology and education companies (Davis, 2010). New products and services will need to be created to support this initiative. Davis (2010) proposed to make the National Technology Plan actionable, collaboration between key stakeholders is necessary to discuss technology platform standards, innovations, research and development, and teacher support. Private industry must be allowed to innovate and collaborate with other companies, the government, instructors, parents, and students (Davis, 2010).

Summary

Learners of the Net Generation have grown up in a very different world than their teachers. Students do not know a world without computers, the Internet, or cell phones. Rosen (2010) stated, "Students, known as iGeners or the Net Generation, have redefined communication and are highly social" (p. 14). Sprenger (2010) explained, "The Net Gens are digital natives who have grown up in the digital era. Nothing scares them about technology. Nothing surprises them. In fact, their expectations are such that this is all very normal" (p. xiii).

Educators face the challenge to engage these learners in meaningful ways by using best practices, such as a constructivist approach to instruction. Prensky (2010) stated:

> Today's students want to learn differently than in the past. They want ways of learning that are meaningful to them, ways to make them see, immediately, that the time they are spending on their formal education is valuable, and ways that make good use of the technology they know is their birthright. (p. 3)

However, generational differences can create barriers to technology integration. High quality professional development for teachers is necessary to connect the generations and integrate technology effectively in instruction. November (2010) surmised, "Teachers do not need a lot of technical skills. Teachers need an ability to manage the use of many technologies in the classroom without having to know the technical details" (p. 48). New standards, such as the 21st Century Skills Framework and the National Technology Plan, were created to help students succeed in the new global economy and thrust educators into the digital age.

In Chapter Three, the methodology of the study was discussed. The analysis of data was presented in Chapter Four. In Chapter Five, recommendations for future studies and implications for educators were discussed.

Chapter Three

Methodology

The purpose of this study was to examine the use of technology by eighth grade students and teachers and perceptions of students and teachers toward technology use in the classroom and home. A mixed research design was chosen to accomplish this task. Hunt (2007) concluded that a mixed design provides numbers and text. Johnson and Onwuegbuzie (2004) characterized mixed methods research "as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study" (p. 17). A case study of the perceptions of students and teachers was conducted to yield qualitative data. Interviews of sixteen students and twelve teachers were conducted to capture the thoughts and opinions of southwest Missouri teachers and students in one selected public junior high school. Quantitative data from a national survey, Speak Up, were disaggregated to compare responses of teachers and students in the survey to those in the case study.

In this chapter, the rationale and research design were presented. The population and sample were explained and the protocol for conducting the study was described. Specific procedures for data analysis were discussed. Finally, ensuring credibility and consistency, as well as, an explanation of the researcher's biases and assumptions were presented.

Rationale

Mullan (2008) explained students and teachers view the use of technology differently due to the digital divide. This study was undertaken to examine the perceptions of eighth grade students and teachers of technology use in classrooms and

outside of school. Furthermore, this study was intended to explore the possible barriers to technology integration in classroom instruction and participation. The primary source of data was qualitative in nature and survey results provided quantitative data. More insight and understanding of technology perceptions were gained through the combination of qualitative and quantitative data in this study.

Qualitative Research

Strauss and Corbin (as cited in Hoepfl, 1997) defined qualitative research as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (p. 1). Gerdes and Conn (2001) concluded qualitative methods offer a means to examine persons or groups who often are outside the norm. Qualitative research is not dependent on statistical data but rather data obtained from observations, interviews, and other samplings. Hoepfl (1997) offered descriptions of qualitative research:

- Qualitative research uses the natural setting as the source of data. The researcher attempts to observe, describe and interpret settings as they are.

- The researcher acts as the "human instrument" of data collection.

- Qualitative researchers predominantly use inductive data analysis.

- Qualitative research reports are descriptive, incorporating expressive language.

- Qualitative research has an interpretive character, aimed at discovering the meaning events have for the individuals who experience them, and the interpretations of those meanings by the researcher.

- Qualitative researchers pay attention to the idiosyncratic as well as pervasive, seeking the uniqueness of each case.

- Qualitative research has an emergent (as opposed to predetermined) design, and researchers focus on this emerging process as well as the outcomes or product of the research.

- Qualitative research is judged using special criteria for trustworthiness. (pp. 2-3)

Qualitative research provides another lens to focus on the research purpose. The information obtained through qualitative methods enriches the data collected in conjunction with quantitative tools. In this study, the field notes provided record of participant feedback and comments. The qualitative data emerged from the interviews and outcomes were based on the responses of the participants in the case study.

Case study research.

Yin (2009) defined a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 18). Case study research focuses on an issue with individuals, multiple individuals, program, or activity (Creswell, Hanson, Plano, & Morales, 2007). Green, Camilli, and Elmore (2006) explained, "A case study involves using both qualitative and quantitative data" (p. 117).

Utilizing qualitative and quantitative data creates a mixed design. Hunt (2007) stated, "Mixed design is research in which you use quantitative data for one stage of the research study and qualitative data for the second stage of research" (para. 3). Hunt (2007) suggested that both types of data have limitations and positive characteristics.

Therefore, using a case study with mixed design allows the researcher to increase validity and accuracy of information (Hunt, 2007). Yin (2009) discussed the case study inquiry, which includes a mixed design:

> The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis. (p. 18)

Merriam (2009) defined triangulation as, "using multiple investigators, sources of data, or data collection methods to confirm emerging findings" (p. 229).

Qualitative data were gathered from face-to-face interviews of teachers and students. Quantitative data were collected in the second part of the study from the Speak Up Project (2008) National Survey results. The validity and accuracy of information were increased by using both research designs in this case study.

Quantitative Research

In quantitative research, a tool, such as a survey or experiment, is used to collect data that measures attitudes, perceptions, and information. The data are then analyzed using statistical procedures and hypothesis testing (Creswell, 2009). Quantitative data is used in case studies to explain the outcomes of a behavior or event (Yin, 2009). Credibility and reliability are ensured through triangulation. The quantitative data provide an additional source of information to build themes in a study (Creswell, 2009). Themes based on multiple perspectives provide validity (Creswell, 2009).

The results of the Speak Up (2008) National Survey of teachers and students addressed current themes in regard to perceptions and use of technology at home and school. Project Tomorrow researchers (2010), the sponsors of the Speak Up project, identified themes from the survey results. These themes were compared to those collected in the qualitative research of this study. Patterns, differences, and commonalities were explored through the use of both quantitative and qualitative data.

Research Questions

Research questions provided a structure for gathering data in this study. The questions were framed to illicit information as to how students and teachers use and perceive the use of technology in everyday practice and learning. The following questions guided the research project:

1. In what manner do eighth grade students and teachers use technology in their everyday lives?

2. How do students and teachers envision using technology in the classroom?

3. What barriers do students and teachers perceive as reasons for limited technology use in the classroom?

Population and Sample

Students and teachers from one public junior high school comprised the population. A purposeful sample was crucial to the focus of the study. Merriam (2009) stated, "Purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 77). The sample included sixteen eighth grade students and twelve eighth grade teachers. Both male and female participants were included in the

sample. In this study, perceptions surrounding technology use of students and teachers were obtained through face-to-face interviews.

The purpose of this study was to examine eighth grade student and teacher perceptions of technology usage. This age group was selected due to the mandatory Eighth Grade Technology Proficiency Exam given to all students across the nation in compliance with NCLB legislation (Klinkefus, 2009). Also, this grade level represents a pivotal time in the lives of learners due to their knowledge and use of technology. Moreover, eighth graders represent the historical Net Generation, those born in the digital age.

Additionally, this study explored possible barriers to technology integration in classroom instruction. Students were selected from the eighth grade population in the district based on enrollment in basic or honors level core classes and gender. A wide range of academic performance and balance of males and females were considerations for selecting participants. Teachers of eighth grade core subjects (math, social studies, science, and Communication Arts) were selected. The selection of core teachers was based on the assumption that core teachers would be more apt to integrate technology in their daily instruction, than perhaps teachers in the arts or physical education. Sixteen eighth grade students and twelve teachers were interviewed based on availability and willingness to be interviewed.

District Demographics

The selected school district for this study is located in southwest Missouri. The total student enrollment for the district during the 2009-2010 school year was 5,303. Almost thirty-two percent of the students receiving free and reduced price meals (Annual

Report Card, 2010), or the percentage of students qualifying for the National School

Lunch Program (Food and Nutrition Service, 2010). The graduation rate for this district

was 91% compared to the state average of 85 % (Annual Report Card, 2010). The district

had a ratio of 18 students to one teacher (Annual Report Card, 2010).

The district consists of seven elementary buildings, one junior high, one high

school, and one alternative high school. As of 2009, the average years of experience of

certified staff in the district was 11.6 %, compared to the state average of 12.2% (Annual

Report Card, 2010). The cost per student in the district was $7,951.00 compared to the

state average of $10,019 (Annual Report Card, 2010). The average teacher salary in the

district was $46,649 (Annual Report Card, 2010). This school district has earned

Accredited with Distinction in Performance for eight consecutive years in a row

(MODESE, 2010). Accredited with Distinction honors are awarded to districts with

outstanding overall performance ratings based on test scores, graduation rates,

attendance, and courses offered by the district (MODESE, 2010).

In 2009-2010, the junior high in the district had 821 students in grades seven and

eight, and the average attendance rate was 95.3% (Annual Report Card, 2010). The

percentage of students enrolled in the free and reduced price meal program at the junior

high was 31.4% compared to the district percentage of 31.8% (Annual Report Card,

2010). The average number of years of experience for the teaching staff at the junior high

was 12.1 years. (Annual Report Card, 2010).

Table 1

District and Junior High Demographics Compared to the State

Descriptors	District	Junior High	State
Attendance Rate	95.9%	95.3%	95.1%
Free/Reduced Rate	31.8%	31.4%	43.7%
Graduation Rate	91%	N/A	85%
Teachers' Years of Experience	11.6	12.1	12.2
Cost Per Pupil	$7,951	$7,951	$10,019

Note. Annual Report Card (2010). Data from the 2009-2010 school year.

Census of Technology

The Census of Technology is provided by each school district in Missouri every year in compliance with the Missouri Department of Elementary and Secondary's [MODESE] yearly report card data collection. The Census of Technology provides a snapshot of the amount of technological tools present within a school district, (MODESE, 2010). Districts use the information from the Census of Technology to set professional development goals and budget priorities. The results from the 2009 Census of Technology demonstrated a perceived high level of teacher technology skill and access to technology.

Table 2

District Census of Technology

Group	Budget for Technology	Teachers at Intermediate Skill Level of Technology	Number of Personal Computers/Mac Computers	Ratio of Students to Computers	Internet Connections to Computers
District	$1,162,695	80%	1,746	3.15	100%
Junior High	N/A	83%	284	2.96	100%

Case Study Protocol

Proper protocol was followed to protect the rights of the participants during the

course of this study. Approval of the study was obtained through the Institutional Review

Board of Lindenwood University (see Appendix A). Quantitative data were secured from

Project Tomorrow, sponsors of the Speak Up 2008 national technology survey; with a

letter of consent to use the data in this study (see Appendix B). The Speak Up Project

2008, sponsored by Project Tomorrow, used an online survey to gather data regarding

technology usage in classrooms and in homes (Manzo, 2009). Students and teachers in

kindergarten through twelfth grade were surveyed (Manzo, 2009). Manzo (2009)

explained all 50 states were represented in the study and included "28,000 teachers,

21,000 parents, and 3,000 administrators" (p. 10). The Speak Up Survey is conducted

yearly to monitor the trends, use, and perceptions of technology by students and teachers

(Project Tomorrow, 2010).

Permission to conduct the study was assured from the superintendent of the selected district (see Appendix C). Participants were contacted by telephone, letter, and email to establish a date and time to conduct interviews. A letter of introduction stating the purpose of the study (see Appendix D) and the proposed interview questions (see Appendix E) were provided to the participating teachers and parents of participating students. Letters of consent (see Appendix F) were obtained from teachers and the parents of participating students.

Interviews were conducted at various locations based on the participants' schedules and availability. Merriam (2009) explained the need for interviews in research:

> Unlike survey research, in which the number and representativeness of the sample are major considerations, in this type of research the crucial factor is not the number of respondents but the potential of each person to contribute to the development of insight and understanding of the phenomenon. (p. 105)

Approximately one hour was allotted to conduct the interviews using the interview question guide (see Appendix E). Each teacher was asked to read and sign the letter of consent prior to beginning the interview. Assurance of parent permission was shared with each student. The procedure for the interview was explained and the opportunity to ask questions or withdraw from the interview process was extended to each participant.

All interviews were video-taped, with permission of participants, for accuracy of responses. All interviewed participants responded to the same questions and were encouraged to comment and add information about the topic of technology. Field notes regarding the responses were taken during the interview sessions. Anonymity was assured to encourage open, honest dialogue during the interview process. Following the

interviews, the responses were transcribed. The transcripts were typed verbatim as per the

participants' responses. All data collected, including video-tapes, transcripts, and field

notes were kept secure in a locked cabinet directly supervised by the researcher. All

documents will be destroyed three years following the completion of the study.

Pseudonyms were used to assure anonymity of participants. A pseudonym, Smith Junior

High, was used to identify the case study school.

After the transcripts were completed, the responses from the teachers and

students were coded as a means to evaluate for similarities and differences. The responses

were examined for common words and phrases. Then, the responses from teachers and

students were tabulated and converted to a percentage. The coded responses were then

compared to the national findings of the Speak Up Survey 2008 results. Conclusions and

findings were based on the comparison of survey results and interview responses.

Research Design

This study was determined to be a mixed-method design based on qualitative data

obtained through a case study of one school public junior high school. This design

offered the participants the best opportunity to share perceptions, attitudes, and personal

knowledge of technology. The population of this inquiry was limited to eighth grade

students and teachers of eighth grade students. The population was further confined by

the demographics of one public junior high school in southwest Missouri.

Data collection was achieved through interviews of participants. Secondary data

were collected from Project Tomorrow (2010), the sponsor of the national technology

survey, Speak Up 2008. Comparison of the interview data and the survey results was

used for triangulation of data. Brown (2005) defined, "Triangulation of data refers to the

collection of multiple types of data and comparing the sources of information to establish validity" (p. 212).

Data Analysis

Brown (2005) explained the analysis of interview transcripts can be based on identifying patterns in the data by means of thematic codes. Creswell (2009) stated, "The traditional approach in the social sciences is to allow the codes to emerge during the data analysis" (p. 187). The data of this inquiry were analyzed by using the constant comparative method (Strauss & Corbin, as cited in Brown, 2005). The constant comparative method of analysis provided review of each line, sentence, and paragraph of the interview transcriptions to determine patterns in the data (Brown, 2005). Codes were used to identify similarities, differences, and general patterns. The interview results were then compared to the Speak Up 2008 results. Commonalities and variances based on the data were discovered.

Credibility and Consistency

Credibility and consistency are necessary to provide validity and reliability of a research study (Creswell, 1998). Strategies utilized during this study that foster validity and accuracy of findings included triangulation of data and field notes. Internal validity was maintained throughout the study by means of precise transcriptions and analysis of survey results. Reliability was supported by providing an audit trail detailing how data were collected, how patterns emerged during analysis, and how commonalities between survey data and interview findings were determined. Additionally, a personal digital folder was created to document emails sent and received, interview schedules, letters mailed, and consent from Project Tomorrow for Speak Up data.

Criteria for selection of participants were established along with procedures for data collection and analysis. All transcripts, field notes, and video-tapes were secured in a locked cabinet directly supervised by the researcher. A review of data by an experienced researcher substantiated credibility and consistency.

Biases and Assumptions

The focus of this study was to examine the perceptions of students and teachers in regards to technology. The researcher serves as a technology integration specialist and believes technology integration is an effective instructional approach. This understanding was recognized as a potential bias for the study. To prevent personal biases from impacting the results and ensure validity, safeguards were implemented. Triangulation of data, identified protocols for the study, and data management procedures were used to prevent biases. This inquiry assumed the participants would answer honestly and openly during the interviews.

Summary

In Chapter Three, the research design and methodology were discussed. An understanding of qualitative, case study, and quantitative research was presented. The population and sample of participants were described and the demographics of the participants explained. A rationale for selection of the research design and a description of the procedures of data analysis were stated. Strategies to ensure consistency and credibility were discussed. Possible biases and assumptions were noted. In Chapter Four, a detailed report of the data collected and analysis were presented. Chapter Five included a discussion, conclusions, and recommendations for future studies.

Chapter Four

Presentation and Analysis of Data

Introduction

The purpose of this study was to examine eighth grade student and teacher perceptions of technology usage. A case study of one junior high school in southwest Missouri was conducted to gather attitudes and perceptions of students and teachers through face-to-face interviews regarding technology. Survey results from the Speak Up 2008 project were compared to the interview responses to further understand the scope of technology usage. The following research questions guided the study and were considered throughout the data analysis process:

1. In what manner do eighth grade students and teachers use technology in their everyday lives?

2. How do students and teachers envision using technology in the classroom?

3. What barriers do students and teachers perceive as reasons for limited technology use in the classroom?

Participants were interviewed at various locations within their school. Survey results from the Speak Up 2008 project were obtained from the Project Tomorrow organization, the sponsors of the survey. Transcripts from interviews were coded to examine the individual responses for similarities and differences. Common phrases or words, beliefs, and perceptions were identified through open coding, or more specifically, a constant comparative method (Merriam, 2009). Each response was constantly compared to previous responses to discover the main categories. Then, axial coding was utilized to understand the relationship between the categories and themes. Merrriam (2009) defined

axial coding as "the process of relating categories and properties to each other, refining the category scheme" (p. 200). The survey results from Speak Up 2008 provided quantitative information to triangulate the data. The questions for the interviews and survey were similar; thus, comparisons could be made between the national survey results and the responses from the participants involved in the case study. Consequently, three overarching themes emerged from the data: communication is the primary use of technology; students typically feel more knowledgeable about technology and use it more often than teachers; and technology is primarily used as a visual tool, rather than an interactive resource in the classroom.

Organization of the Chapter

The purpose of this chapter was to provide a summary of the data concerning the population and sample of participants, followed by a review of the protocol involving the collection of data. The process for the analysis of data was described and the results of the interview questions were discussed. Then, the interview results were compared to the findings from the Speak Up 2008 national survey. To assure confidentiality and anonymity, a coding system was created to label the participants. Also, a pseudonym, Smith Junior High, was used in this study to maintain confidentiality.

Participants

The participants interviewed were from Smith Junior High, a public school located in southwest Missouri. Sixteen eighth grade students were selected based on a range of academic abilities and gender to provide a balance of experience (see Table 3). Four male students and four female students enrolled in basic core classes and four male students and four female students enrolled in honors level core classes were interviewed.

Table 3

Coding of Smith Junior High Eighth Grade Students

Student	Honors or Basic Classes	Gender
1(MH)	Honors	Male
2(FH)	Honors	Female
3(FB)	Basic	Female
4(FH)	Honors	Female
5(MB)	Basic	Male
6(MB)	Basic	Male
7(MH)	Honors	Male
8(MH)	Honors	Male
9(FB)	Basic	Female
10(MB)	Basic	Male
11(FH)	Honors	Female
12(FB)	Basic	Female
13(MH)	Honors	Male
14(MB)	Basic	Male
15(FH)	Honors	Female
16(FB)	Basic	Female

Note. Example: 16(FB) represents Student 16, a female in basic core subject area classes.

Twelve core teachers of eighth grade students from the selected junior high were interviewed. The teachers' attributes varied in years of teaching experience, level of post graduate degree, subject area, and gender, as shown in Table 4.

Table 4

Coding of Smith Junior High Eighth Grade Teachers

Teacher	Subject Area	Years of Experience	Degree	Gender
E(F19)	English	19	Master's Degree	Female
E(F18)	English	18	Specialist	Female
E(F14)	English	14	Bachelor's Degree	Female
M(M17)	Math	17	Master's Degree	Male
M(F9)	Math	9	Master's Degree	Female
M(F8)	Math	8	Bachelor's Degree	Female
S(F14a)	Science	14	Master's Degree	Female
S(F14b)	Science	14	Bachelor's Degree	Female
S(F4)	Science	4	Master's Degree	Female
SS(F13)	Social Studies	13	Master's Degree	Female
SS(M12)	Social Studies	12	Master's Degree	Male
SS(F4)	Social Studies	4	Master's Degree	Female

Note. Example: SS(F4) represents Social Studies Teacher, Female with 4 years of teaching experience.

Compendium of Findings

Protocol

Yin (2009) stated, "The protocol is a major way of increasing the reliability of case study research and is intended to guide the investigator in carrying out the data collection from a single case" (p. 79). Participants and parents of student participants were contacted initially by email, telephone call, and letter to explain the study and establish a date and time to conduct the face-to-face interviews. A letter of introduction stating the purpose of the study, a copy of the interview questions, and a letter of informed consent were mailed or sent electronically to each participant (teacher) or parent of participant (student). Follow up messages were sent through email to assure the forms had been received and verify the interview location and time schedule.

Interviews

Merriam (2009) explained, "Interviewing in qualitative investigations is more open-ended and less structured. Less structured formats assume that individual respondents define the world in unique ways" (p. 90). At the beginning of the teacher and student interviews, an informal discussion regarding the purpose of the study and the ethical guidelines for the protection of the participants were discussed. Teachers were asked to sign the required consent forms prior to starting the interview. Students were informed they were free to ask questions and withdraw from the interview at any time. Parental consent and approval were obtained before beginning the interview.

The interview sessions were video-taped, with participants' permission, to assure the responses were transcribed accurately. Field notes were taken during the interview to document responses. Each participant was offered the opportunity to review the

responses and field notes for accuracy. All interview sessions were transcribed and responses coded to identify similarities and differences in responses.

Data Analysis

Transcripts were analyzed using the open and axial coding processes. Rossman and Rallis (as cited in Creswell, 2009) defined coding as "the process of organizing the material into chunks or segments of text before bringing meaning to information" (p. 186). Creswell (2009) elaborated, "It [coding] involves taking text data or pictures gathered during data collection, segmenting sentences (or paragraphs) or images into categories, and labeling those categories with a term based in the actual language of the participant" (p. 186). The first step in the coding process involved examining the data for common words and phrases within responses. The second step in the coding, axial coding, analyzed the beliefs and perceptions and was used to refine the categories. Percentages were determined based on the number of participants responding with similar words or phrases. Following the coding process, data from the Speak Up 2008 national technology survey were examined and compared to the case study findings.

Triangulation of data was achieved by examining the survey results, interview responses, and field notes. Allowing each participant the opportunity to view the video-taped interview and field notes, provided accuracy. Once the data from the interviews and survey were analyzed, three overarching themes emerged: communication is the primary use of technology; students typically feel more knowledgeable about technology and use it more often than teachers; and technology is primarily used as a visual tool, rather than an interactive resource in the classroom. The theories of multiple intelligences, differentiated instruction, and best instructional practices based on constructivism,

provided support for the analysis. Understanding generational differences and the need for high quality staff development further enhanced the findings.

Interview Responses

Interview Question 1. What type of technology user are you? Advanced, average, or beginner?

Tapscott (2009) and Prensky (2010) described this generation as the Net Generation or Digital Natives because they have been immersed in technology. Tapscott (2009) suggested students see themselves as technologically knowledgeable and view technology use as part of their daily routine. Generational differences between digital natives and immigrants were evident in the discussion of the level at which participants viewed their technology use. Smith Junior High students and teachers perceived students as more knowledgeable of technology.

Thirty-one percent of Smith Junior High students considered themselves to be an advanced technology user as compared to only 25% of the Smith Junior High teachers (see Tables 5&6). Five students considered themselves advanced, three of whom are honors students. The majority of students felt they were average users. Four teachers, each with less than 15 years of teaching experience, perceived themselves as advanced. None of the Smith Junior High students perceived themselves as beginners; however, 17% of the Smith Junior High teachers viewed themselves as beginners. Each of the teachers considering himself/herself to be beginners had taught eleven or more years. Teacher S(F14a) explained, "There is a lot of technology I know how to use and utilize, but there is a lot to learn, and I have a long way to go when I look at other people and where they are at."

Most of the students expressed they felt confident about their technology use. Students 4(FH), 5(MB), 6(MB), and 9(FB) responded with a common phrase, "I know some things, but I don't know everything." The teachers' responses were not as confident. Teacher E(F19) said, "I know enough to know that I am totally ignorant." Teacher SS(F13) agreed, "I don't use it as much as I should, I am not as comfortable with it."

Twenty-four percent of eighth grade students responding to the Speak Up 2008 survey perceived themselves as advanced technology users (Project Tomorrow, 2009). Thirty-one percent of Smith Junior High students believed they were at the advanced level. Student 14(MB) stated, "I am on the computer everyday, and I can figure out most software by just kind of messing around with it." None of the Smith Junior High students considered themselves beginner technology users, yet 5% of the Speak Up student participants believed they were beginners (Project Tomorrow, 2009). Speak Up researchers discovered 33% of teachers viewed their technology ability as advanced, while only 25% of the Smith Junior High teachers defined themselves as advanced (Project Tomorrow, 2009).

Table 5

Smith Junior High Teacher Self Perceptions of Technology Skills

Years of Teaching	Advanced Level Teachers	Average Level Teachers	Beginner Level Teachers
0-5	2	0	0
6-10	1	1	0
11-15	1	3	1
16-20	0	1	2

Table 6

Smith Junior High Student Self Perceptions of Technology Skills

Academic Level & Gender	Advanced Level Students	Average Level Students	Beginner Level Students
Honors Male	0	4	0
Honors Female	3	1	0
Basic Male	1	3	0
Basic Female	1	3	0

Interview Question 2. What types of electronic devices do you use in your daily life?

Communication was the primary utilization of technology by Smith Junior High teachers and students. Gardner (2009) proposed individuals possess certain intelligences that enhance learning. Interpersonal intelligence is the need to communicate with others (Gardner, 2000). Students and teachers are living in a world of constant communication

(Sprenger, 2010). Technology is an effective way for all learners to communicate, especially those with interpersonal intelligence.

Ninety-four percent of the Smith Junior High students used cell phones daily; as well as 6% of students using a smart phone with Internet access. Thus, 100% of Smith Junior High students used cell phones either with or without Internet capability daily (see Table 7). One hundred percent of the students also reported using a computer daily. In contrast, only 75% of Smith Junior High teachers noted they used a cell phone daily, with 8% owning smart phones. Teacher SS(F4) elaborated, "I couldn't live without my Blackberry. I don't understand what people do without Internet access on the phone." Teacher E(F19) agreed, "I have a cell phone and I text. I am not very fast, but I text to keep up with my teenagers. I like to see what is going on with my kids." Only 83% of teachers interviewed used a cell phone or smart phone daily. Also, only 83% used a computer on a daily basis. Teacher S(F14b) discussed possible reasons for less technology use among teachers:

> I am very reluctant to use technology in my life. I like face time and that is a choice. I don't want my own children to grow up texting all the time. We do a lot of outdoor family things. I do have a cell phone, but I don't text. I only talk on it.

When students were asked about the devices they used outside of school, they simply gave a list of devices without additional comment. Teachers tended to explain how and why they either used something or did not choose to use technology devices.

Speak Up student participants used cell phones and computers less than the case study participants. Ninety-seven percent of surveyed students used cell phones with or without Internet access, and only 76% used a computer daily (Project Tomorrow, 2009).

However, 100% of Speak Up teacher participants responded they used cell phones and 90% of surveyed teachers used computers daily (Project Tomorrow, 2009). This is a higher percentage of teachers using digital devices than the percentage of the Smith Junior High teacher participants.

Table 7

Smith Junior High and Speak Up 2008 Participants' Use of Digital Devices

Response	Smith Junior High Students	Smith Junior High Teachers	Speak Up 8th Grade Students	Speak Up Teachers
Cell phone (without Internet access)	94%	75%	71 %	80%
Computer	100%	83%	76%	90%
Ipod	75%	8%	85%	62%
Smartphone	6%	8%	26%	20%

Interview Question 3. What kind of computer or Internet access do you have outside of school?

Prioritization of owning and maintaining computers and Internet differ due to generational differences (Allen, 2010; Lovely, 2008). The importance of using technology to communicate with family and friends contributed to the ownership of technological devices. All of the Smith Junior High students had accessibility to a computer in their homes. Ninety-four percent of the students had high speed Internet service, with only one student identifying Internet use at home as slow due to the use of an aircard (see Table 8). Conversely, 17% of the Smith Junior High teachers explained

they had neither computer nor Internet at home. Teacher E(F19) discussed the reason for not having Internet at home, "I do not have any. It is because of financial reasons. I use the computer at school to do Net Flix, Facebook, and email. Once I retire, I will have access at home." The remaining 83% of teachers used high-speed Internet service at home. Eighty-five percent of Speak Up student participants reported having a computer at home with Internet access; only 8% did not have computer accessibility at home (Project Tomorrow, 2009). Speak Up teacher participants were not asked about their computer and Internet use.

Table 8

Smith Junior High Participants' Computer and Internet Accessibility at Home

Smith Junior High Participants	Slow Internet	High Speed Internet	Laptop Computer	Desktop Computer	No Computer or Internet	Both Laptop and Desktop
Students	1	15	4	4	0	8
Teachers	0	10	3	4	2	3

Interview Question 4 Students. How do you use technology for school work?

Differentiation of instruction and learning allows students to gain information and produce artifacts of learning in a variety of ways (Tomlinson, 1998). Prensky (2010) explained, "In an increasingly populated and crowded world, choice, differentiation, personalization, and individualization have become, for today's young people, not only a reality, but a necessity" (p. 2). Student participants reported using technology to differentiate their learning. Eighty-one percent of the Smith Junior High students

described typing assignments and research as the major uses of technology for school work, as seen in Table 9. Student 14(MB) summarized his use of technology for schoolwork, "Almost every assignment I type or make a PowerPoint. I don't like my handwriting. I use the computer." Student 8(MH) agreed with this idea, "I do research at home and I type stuff up because I have bad handwriting." Student 7(MH) explained the use of technology for school work, "In English, for sure, typing papers. I know in high school I am going to need to do lots of that; Internet for research and looking up things for any projects. I have gotten a lot better at PowerPoints." Student 2(FH) summarized, "I use the online book or look it up on Google if I don't want to take my book home. I type lots. I use a calculator."

Constructivism is a theory explaining how people learn (Concept to Classroom, 2010). Constructivists believe people learn based on "their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences" (Concept to Classroom, 2010, p. 1) Smith Junior High students demonstrated their ability to use their own knowledge of technology and apply their technology skills to their schoolwork. Often, the use of technology took place outside of school, but after reflecting on their own work they were able to improve their assignments by using technology tools.

Interview Question 4 Teachers. How do you use technology to facilitate student learning?

Using technology as a visual tool, rather than an interactive resource was a theme in the teachers' responses to this question. Marzano (2001) promoted the use of graphic organizers, visuals, and strategies that provide immediate feedback as best instructional practices. Marzano (2009) expanded best practices to include using tools such as the

interactive whiteboard for 75% of instructional time with the focus on content. The Smith Junior High teachers described using their LCD projectors to show various visuals such as: YouTube video clips, websites, and PowerPoint presentations. Teacher SS(M12) discussed technology integration:

> I use a lot of PowerPoint presentations, I like to bring in a lot of pictures of things we are studying. I try to let them see what I'm talking about so they connect with things. Lots of PowerPoint, some videos off of YouTube, like documentaries to connect…

Teacher SS(F4) elaborated on the use of technology for facilitation of student learning:

> Everything I do I steal online from teachers. My textbook comes with a cd rom with resources. I love United Streaming. I have used Brain Pop a lot. I use You Tube videos. There is always some posting out there online where someone has already asked the question, and I can find ideas to use. I have a classroom Facebook page. I post classroom assignments every day. I have 85% of the parents ask me things on Facebook. It goes right to my Blackberry, so there is instant feedback. I respond in about 20 minutes. I check it all day. I love the school website. I have all the homework assignments, PowerPoints, PDFs, Word, everything is there so everyone can access it. The textbook is online. They can walk out of my classroom with nothing and come back prepared.

Students commented on the use of technology by teachers in the classroom for instruction. Student 5(MB) explained, "We use the projectors and Smart Boards and You Tube a lot." Student 3(FB) expounded on using visual tools for instruction, "It is used a lot for slideshows and videos because most students are visual learners." Student 7(MH)

expressed his view of how teachers use technology for instruction, "I think they rely on it, not a lot, but in everyday things. We watch a lot of videos and take notes on them. We use a lot of PowerPoints for notes." The comments by both teachers and students of Smith Junior High depicted technology integration as using visual tools, rather than students actually creating products or being part of online projects.

There was a consensus among the participants that the teachers do a good job of using technology to demonstrate content. However, Teacher M(F8) expressed uncertainty, "I am not quite sure how to get them [students] more involved with it [technology]. They use my Airliner a lot. I don't know how to get them more involved with using that stuff. I know there is much more we could be doing."

Speak Up student participants concurred with the Smith Junior High students by listing writing assignments and conducting research as the main uses for technology and schoolwork (see Table 10). Speak Up teacher participants reported using teaching aids such as videos and websites as the most used technology tool in the classroom (Project Tomorrow, 2009).

Table 9

Smith Junior High Participants' Use of Technology for Schoolwork/Student Learning

Responses	Smith Junior High Students	Smith Junior High Teachers
Typing for Assignments	81%	8%
Research	81%	42%
Power Point	58%	42%
Videos/Slideshows	13%	8%
Use of Projector	42%	58%

Table 10

Speak Up 2008 Student and Teacher Use of Technology for Schoolwork/Student Learning

Responses	Speak Up 8th Grade Students	Speak Up Teachers
Access Class Information (e.g. grades, podcasts, assignments)	60%	74%
Teaching Aids (Videos, websites, multimedia presentations)	N/A	68%
Communicate with others using email, IM, or text messaging	54%	93%
Conduct Research	68%	74%
Create Multi-media presentations	59%	54%
Participate in online communities	11%	25%
Participate in video conferences	7%	10%
Read or post to blogs or wikis	14%	26%
Take an online class	7%	33%
Read text-based resources (electronic textbooks, newspapers, magazines)	29%	60%
Complete Writing Assignments	73%	N/A

Interview Question 5. What are some major obstacles to using technology in your school?

Smith Junior High teachers perceived a lack of access as a major barrier to technology use and integration; whereas, the students viewed blocked websites as a major obstacle. Participants were not concerned about having the ability to use their own computers or devices, however, students were bothered by slow Internet access. The teachers did not prioritize Internet use as a major obstacle.

Overall, 38% of Smith Junior High students perceived no obstacles to technology use at school. Student 5(MB) explained the basic barriers to technology use, "Connectivity mainly, sometimes the server kind of freaks out." Student 1(MH) shared his frustration with blocks on websites, "They have all these blocks on things. If you try to research something, more than likely there are blocks on things."

Teachers viewed obstacles differently. Teacher S(F14a) noted, " The mobile lab is a wonderful idea, but with the batteries it just doesn't work right. I wish we had a lab in the classroom." Teacher S(F14b) was very positive, "Beyond when the server goes down, nothing is too major." The teachers also seemed to feel very confident with the support and training they received in their district. Teacher M(F8) explained, "I feel like we get enough training, and I am not afraid to play with it." However, other teachers were overwhelmed at the task of using technology. Teacher E(F19) admitted, "There always seems to be one or two computers not working. I don't really know what I am doing, so if there are problems, it is intimidating to me." Teacher M(M17) responded in a similar fashion:

It is not the district's problem. They provide everything. It is my fears. I'm old

school, and it takes me longer to do things using technology, so I don't. It is my

comfort zone and the fear of not knowing what to do when things don't work. I

don't know how to fix it, so I don't use it. I also have a limited time in class and I

don't have time to work out issues.

Levin and Wadamy (2008) recognized lack of convenient access to computers and lack

of time were significant factors in hindering technology integration. Hooper and Rieber

(1999) identified the need for ongoing, high quality professional development as a means

of providing growth and confidence when using technology.

Speak Up participants listed concerns about using personal computers and devices

at school as a major obstacle. Thirty-five percent of Speak Up student participants

responded that not being allowed to use their own computer or mobile devices was a

huge barrier (Project Tomorrow, 2009). Forty-three percent of the students surveyed

noted firewalls and blocks on websites as a major obstacle (Speak Up, 2008). Speak Up

teacher participants agreed with students in regard to firewalls and blocks being a

problem for technology use in the classroom (Project Tomorrow, 2009). Teachers also

mentioned the lack of equipment and availability as an obstacle (see Table 11).

Table 11

Smith Junior High and Speak Up Participants' Perceptions of Barriers to Technology Use

Responses	Smith Junior High Students	Smith Junior High Teachers	Speak Up 8th Grade Students	Speak Up Teachers
Computers or other tech equipment are not available	13%	42%	11%	31%
I am unable to access the Internet, or it is slow or does not always work	19%	8%	28%	31%
I can't use my own computer or mobile devices	0%	0%	35%	13%
I don't have the skills I need	13%	0%	6%	9%
School filters or firewalls block websites I need to use	25%	0%	43%	42%
Software is not good enough	0%	0%	14%	13%
There are rules against using technology at my school	0%	0%	27%	4%

Interview Question 6. Would mobile devices, such as cell phones or MP3 players, help with schoolwork? If so, how?

Differences between verbal-linguistic, musical-rhythmic, and mathematical-logical learners emerged from the answers of this question. Gardner (1993) described the various ways individuals process information as multiple intelligences. Smith Junior High students responded to interview question six based on their particular intelligence. Smith Junior High teachers responded to the interview question based on their need for class management and control. Ninety-two percent of Smith Junior High teachers and 69% of students did not believe cell phones or MP3 players would help with schoolwork. Teacher M(F9) surmised:

> I think at the junior high level you would have to make sure they [cell phones] are being used for the activity they are asked to be used for. However, to keep them [students] focused and monitoring would be hard to do. They [cell phones] definitely could have a place. We know they are using them anyway so I think it would be really hard to monitor.

Teacher S(F4) espoused her strong opposition:

> I see it as a detriment as far as classroom management. Cell phones in here are kind of the thorn in my side. It really distracts. Unfortunately, it is mostly parents texting the kids. It causes the kids to lose focus. We have a hard enough time battling everything else to keep them focused and it is very distracting.

Teacher E(F18) discussed the use of MP3 players, or iPods:

I don't think it would bother me if they used their iPods, but not knowing what

they are listening to or what they have on there is hard to know. They [students]

are too advanced for me to know what they are doing. It is lack of control for me.

Students perceived more use of iPods in classrooms, rather than cell phones. Student

1(MH) explained, "I don't really know about the cell phone thing. Students may do more

texting and cheating. That would not be beneficial at all. You can download podcasts that

help you learn." Student 12(FB) agreed:

I would say no cell phones in class. MP3 if you are doing work by yourself; you

should be able to use it for concentrating. For me, I listen to music to study and

take tests 'cause I don't want to hear anybody else.

Both students and teachers were hesitant to integrate cell phones into the classroom for

learning.

Sixty-seven percent of Speak Up student participants desired the use of cell

phones in the classroom. This is in contrast to only 31% of Smith Junior High students'

beliefs that cell phones would be beneficial in the classroom (Speak Up, 2008). Eleven

percent of Speak Up teacher participants did not think the devices would positively

impact learning (Project Tomorrow, 2009). Speak Up student participants were asked

how they would use cell phones for school work. Conducting research, text messaging a

classmate, and receiving reminders for assignments and tests were the major uses

mentioned for cell phone utilization in the classroom (Project Tomorrow, 2009).

Interview Question 7. How could your school make it easier for you to work electronically?

The ability to differentiate instruction for all learners would be enhanced by the use of technology (Marzano, 2009). Obstacles such as lack of equipment, time, and training are often barriers to differentiation (Hoyer, 2010). Smith Junior High teachers and students agreed having more computers would be the best way to make working electronically easier at school. Forty-two percent of teachers and 38% of students discussed the need for more computers to make instruction and learning more successful. Teacher S(F14a) commented, "Ideal would be for every kid to have a computer and provide all the opportunities of technology for each kid." Teacher E(F18) concluded that training was also a key component needed to make technology more convenient:

> We need more computer labs. We need more computers. They need training for teachers with time to actually work hands on, actually create things you learn about. We have to have professional development and most teachers have a handle on other teaching concepts, but for most teachers technology is low.

Other teachers perceived training in the district as sufficient. Teacher M(F9) stated:

> Right now the district does a really good job. They offer a lot of different things, and our building technology people are always willing to help and answer questions. Generally, if you want it and you ask, the resources are there. You may not know about it until you want it, but the resources are there.

In addition to more computers and training for teachers, Student 1(MH) shared the need for training for students, "Maybe make computer classes a mandatory class. Colleges are

upping their standards for knowing computers, and I think it should be a mandatory class so you know the basics."

Sixty-seven percent of Speak Up student participants responded allowing individual computers, cell phones, and other mobile devices was the best way to help students work electronically at school (Project Tomorrow, 2009). Other ideas from students were unlimited Internet access and access to social networking sites (Project Tomorrow, 2009) Speak Up teacher participants were not asked this question.

Interview Question 8. If you could design a new type of online textbook, what would you include?

Forty-four percent of Smith Junior High students desired an efficient search engine as part of an online textbook. Students also desired videos and pictures as part of a new design for textbooks (see Table 12). Student 4 (FH) explained, "It would be cool to have links to other resources. [Another feature would be] a blog on the textbook to have other people and teachers' thoughts besides just the written text." Student 5(MB) summarized, "Information should be easy to get and understand. [The text on the screen would be] not as big, so it wouldn't be as intimidating to read. If it [online textbook] had games that is all that I would do." Other students did not see the need for extra features. Student 9(FB) said, "[I want] just the basics, just the information."

Smith Junior High teachers regarded videos and links as high priorities. Teacher S(F4) elaborated on the features, "It [online textbook] would have to be virtual labs and science simulations. I would like to have virtual dissections as an engagement; they want to do it so bad. It really prevents having to purchase all the supplies." While only one teacher mentioned a search engine, six teachers requested easy log in procedures as vital

to an online textbook. Teacher SS(M12) explained, "[The online textbook should be] easy to access. Simple passwords and log ins. Lots of resources on websites, not just the textbook." All of the teachers mentioned added features such as links and visuals, while several students desired only the textbook without extra features.

Speak Up student participants responded much differently from the Smith Junior High participants. Sixty-three percent of the students wanted the ability to make electronic highlights or notes (Project Tomorrow, 2009). Fifty-nine percent of surveyed students named games as a feature they would want included in a textbook (Project Tomorrow, 2009). Students also mentioned the ability to take quizzes and tests online with the new textbook (Project Tomorrow, 2009). Speak Up teacher participants were not asked about online textbook features.

Table 12

Smith Junior High and Speak Up Student Participants' Features to Include in an Online Textbook

Online Textbook Feature	Smith Junior High Students	Speak Up 8th Grade Students
Games	6%	59%
Videos	31%	52%
Pictures	25%	55%
Links	6%	59%
Self Quizzes/Tests	13%	61%
Search Engine	44%	0%
Blog	6%	44%
Ability to Make Electronic highlights or notes	0%	63%
Power Point presentations from Teachers	0%	56%

Interview Question 9. How do you use web 2.0 tools outside of school?

Richardson (2008) discussed the importance of teachers using web 2.0 tools in and out of school. Social networking and other productivity tools are vital means of communicating (DiScipio, 2008). Web tools allow students to construct knowledge, rather than to simply restate facts (Woo & Reeves, 2007). Woo and Reeves (2007) explained the importance of using web-based tools to provide meaningful interaction and tasks; thus allowing students to construct their own learning. Concept to Classroom (2010) authors stated, "Constructivism taps into and triggers the student's innate curiosity

about the world and how things work." (pp. 1-2). Smith Junior High students possessed interest and motivation for using web tools. Students constructed their own learning by using the digital tools; however, most often the learning took place outside of the classroom.

Overall, Smith Junior High teachers and students used web 2.0 tools more often in their daily experience outside of school than the Speak Up participants (see Table 13). Communicating through email or texting was used by both teachers and students. However, four teachers made note they do not text. However, email is used by all teachers due to work requirements. Teacher M(M17) responded, "I don't," when asked about his use of web 2.0 tools. Teacher S(F4) detailed her use of web 2.0 tools for purposes other than teaching:

> I have a blog with our church group. I keep in contact [using] social networking on Facebook with friends and family. Students are not allowed on my personal Facebook page. I do that for protection. I visit other people's blogs to get information, technology information. I was developing a video for my daughter's graduation. I used Animoto.

Teacher SS(F4) also described her ongoing use of technology:

> I'm a techie junkie. I like to have the newest phone, the newest laptop. I use it to streamline my life. I live on Craigslist, the online garage sale. I love eBay. Wikipedia. I like surfing around. I do all my shopping online. I pay my bills online. I follow a couple of blogs.

Teachers with less than five years teaching experience tended to use web tools more often.

Smith Junior High students described their use of technology tools. Student 2(FH) explained, "I read a lot of blogs. I watch a lot of YouTube. Facebook. I make blogs too." Student 1(MH) generalized, "YouTube is big!" Most of the students noted using Facebook to socialize and watching YouTube for entertainment. Student 14(MB) commented, "I put up funny videos, socialize with friends and family out of state."

Forty-two percent of Speak Up student participants updated their profiles on a social media site such as Facebook, and 20% wrote or contributed to a blog (Project Tomorrow, 2009). Thirty percent of Speak Up teacher participants uploaded or downloaded videos, podcasts, or pictures to the Internet, yet only 10% wrote or contributed to a blog (Project Tomorrow, 2009).

Table 13

Smith Junior High and Speak Up Participants' Use of Web 2.0 Tools

Responses	Smith Junior High Students	Smith Junior High Teachers	Speak Up 8th Grade Students	Speak Up Teachers
Upload or download videos or photos to the Internet	56%	42%	43%	30%
Communicate with others through email, IM, or text message	100%	100%	49%	17%
Communicate with social networking	81%	75%	42%	15%
Write or contribute to a blog	19%	17%	20%	10%

Interview Question 10. Imagine you were designing the ultimate school. What would you include to have the greatest impact on your learning?

Smith Junior High students and teachers were content with the technology available in their school and would want those same components to be present in the imagined ultimate school (see Table 14). Interactive whiteboards and projectors were mentioned as a desired feature in the ultimate school. Since the teachers and students already had interactive whiteboards and projectors in their classrooms, they assumed a new school would have them also. Both teachers and students expressed a major desire for one-to-one laptops or desk top computers. The Speak Up participants envisioned a higher use of mobile devices, online textbooks, and online courses. Some Smith Junior High participants envisioned less traditional technology approaches. Student 1(MH) imagined:

> More like a virtual thing you could access from a computer at home. It is a classroom and everyone has webcams and you can see the teacher and everyone can see each other, but you don't have to be at school. Stay at your house. You can meet for special activities like football.

Student 4(FH) desired more interaction with technology. She explained, "A computer lab would be used whether it was for typing or clickers for math. Lots of online videos and such. I wish there were more online projects." Teacher M(F9) described a school without books:

> Maybe letting them have Kindles instead of carrying around all the books. If they had that one thing, they would have it, and it would be more convenient and less stress on their backs. Computers for every kid to have one. A lot of kids don't

have technology at home. Make sure students were aware of how to use tools in

all subject areas.

Two students wished that every class would be an eMINTS classroom. This would allow

the students more access to computers and unlimited access to the Internet. Teachers

requested more time in classes to actually use technology, not just use it for instruction.

Prensky (2010) suggested teachers and students should develop partnerships in learning

to provide learning experiences that mirror the world outside of school. Pink (2009)

encouraged teachers to embrace technology as a way to prepare students for the global

marketplace, not just as a visual presentation tool.

Table 14

Smith Junior High and Speak Up Participants' Desired Ultimate School Features

Responses	Smith Junior High Students	Smith Junior High Teachers	Speak Up 8th Grade Students	Speak Up Teachers
Collaboration tools (social networking, blogs, wikis)	0%	0%	44%	31%
Communication tools (email, IM, text messaging)	31%	8%	52%	42%
Computer projection devices	100%	100%	50%	35%
Digital media tools (video, audio)	100%	100%	54%	32%
Digital resources	6%	8%	48%	35%
Document camera	6%	8%	45%	24%
Online textbooks	6%	0%	50%	32%
Handheld student response systems	6%	8%	46%	25%
Interactive whiteboards	100%	100%	47%	40%
Mobile devices (cell phones, MP3 players)	31%	8%	49%	15%
Online classes	6%	0%	45%	21%
Computer for each student	75%	66%	35%	14%
Unlimited Internet access	13%	8%	42%	15%

Interview Question 11. How much do you rely on technology in your daily life/school?

Trilling and Fadel (2009) recognized the shift from the Industrial Age to the Knowledge Age. While teachers and students view technology as important, generational differences impact the familiarity with technology for personal use (O'Donovan, 2009). All Smith Junior High participants agreed technology is a big part of culture and daily life. In regard to the level of use, Teacher SS(F4) remarked:

> I think it depends on the teacher, and a big factor there is the age of the teacher. I think the younger generation embrace technology. Other teachers, especially those that have been around 25 years, I know it is very threatening just because it is different. It is hard. I feel like teachers are doing a great job of integrating it.

Student 8(MH) added:

> It [technology] is a good thing to have in schools. I don't think the school should rely on it too much. Sometimes the teachers know more, but most of the students can do more just because of the generation we are from.

Student 16(FB) admitted, "We take advantage of it [technology use]. We use it for things we should probably have to think about. We use technology more than adults do."

Interview Question 12. Overall comments and thoughts about technology.

Teachers and students were asked to share their overall thoughts about technology today. The feelings and opinions of both teachers and students provided more information to understand their perceptions of technology use. Teacher S(F4) proposed:

> It [technology] is a train that is in motion, and we either have to embrace it and get on that train or we are not going to be able to connect with them [students]. We have to be able to talk to them. Talk the language, talk the talk. We have to

build relationships using that technology, even though I know we have to have
safety precautions. You have to ride the train and not resist it. Technology
changes frequently. You have to be ready to upgrade and change very quickly. I
like technology. I enjoy learning the new stuff, the new websites. The kids like
them.

Teacher S(F14a) concurred, "Kids know more than the teachers. It is the wave of the
future. Kids would get bored without it in the classroom. It is ongoing and some teachers
are more advanced. The kids have all grown up with it, and it is what they know." Other
teachers had concerns about technology integration in school and daily life. Teacher
M(M17) noted, "I think in some ways technology has hurt the learning process because
kids don't know the process of things, or have not memorized key things. In some ways
their thinking processes are lower." Teacher S(F14b) also had concerns regarding the
abundant use of technology, "I want them to be better trained in being safe using
technology. I think they can't spell. Their texting flows over into their constructed
responses. They are racing through things online and leaving a trail that anyone could
find them."

Students also shared their perceptions of technology use. Student 4(FH)
commented, "Right now I think the students are more advanced in technology than the
teachers. I think it will slowly catch up. Hopefully soon we will all be on the same page
and agree on how to use technology." Student 13(MH) admitted, "Kids rely on it too
much. They don't know how to work things out because they use the computer or
calculator." Student 5(MB) expressed the view of most participants, "Kids are - like more
in the generation of technology. Some of the parents haven't known the technology as

much. We are used to it. You just have it. We were born with it." All participants seem to agree technology is part of this generation, but the confusion arises on how best to use technology for instruction and everyday practice.

Rosen (2010) discussed the need for educators to participate in high quality professional development, to not only learn how to use the technology tools, but how to differentiate instruction to meet the needs of all types of learners. Matzen and Edmunds (2007) explained, "When teachers become comfortable with technology to the point where they can integrate it more effectively, they use it in ways that emphasize a more constructivist, learner-centered approach" (p. 419). Smith Junior High teachers were unsure of how to use technology in a constructivist approach. Teachers were able to use the digital tools for traditional instruction, but struggled with having students construct their own learning.

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

Presented in Chapter Four were the data compiled from interview responses and survey results. A description of the participants was included in this study. An explanation of the protocol and process of data analysis were presented to describe the perceptions and use of eighth grade students and teachers in regards to technology. Smith Junior High students used technology more than their teachers. Smith Junior High teachers were unsure of how to use technology tools to allow students to construct their own learning. Teachers were comfortable with utilizing technology for visual presentations, but not in having students use web tools to enhance learning. Both teachers and students at Smith Junior High viewed the students as being more knowledgeable of technology.

The overarching themes of communication, level of technology knowledge, and visual tools were discussed thoroughly in this chapter; as well as the contextual underpinnings of multiple intelligences, differentiated instruction, best instructional practices based on constructivism, generational differences, and the need for high quality staff development. A summary of the findings, a comparative analysis of the findings, limitations of the study, conclusions, recommendations for future research, implications for practice, and summary were presented in Chapter Five.

Chapter Five

Summary and Conclusion

Introduction

The purpose of this study was to examine eighth grade student and teacher perceptions of technology usage. Solomon and Schrum (2007) stated, "The changing nature of information and the new ways our students understand and make sense of the world signal that we need new strategies and new tools for teaching and learning" (p. 1). Student 2(FH) in this study expressed her views of technology:

> I think it (technology) is very important. I think the students usually have a better understanding of it just because of our generation, and I think that if we didn't have the technology everything would be much more complicated in school. We would have to look up things in books. I think using technology means using it in creative ways, not just pulling a website up, but making a video or a sketch that you have to create and edit.

Even though technology is available in most schools today, teachers still struggle with the best way to integrate it in the classroom. Teacher E(F18) summarized:

> I feel kind of bad for them [students] because school is something they become very negative about because we are so behind the times. There is no quick fix and it is all about money and that makes it worse. I really feel we do a disservice, but our hands are tied. It is really frustrating because it could be a lot better than it is. I don't know what the answers are. It is about them [students]. I feel that they want to know how things apply to them and I think, "It doesn't". You are living in a new world and school is way behind.

Verhaagen (as cited in Jayson, 2010) stated:

> They [students] know every piece of information they [students] want is at their
> disposal whenever they need it. They [students] are less interested in learning
> facts and learning data than in knowing how to gain access to it and synthesize it
> and integrate it into their life. (p. 1)

The challenge of educators is to understand digital natives and find ways to mirror the technology used at home in the classroom (Prensky, 2008; Tapscott, 2009).

One junior high school located in southwest Missouri, referred to as Smith Junior High, was chosen as the research site. Eighth grade students and core teachers of eighth grade students were selected due to the mandatory Eighth Grade Technology Proficiency Exam given to all students across the nation in compliance with NCLB legislation.

Sixteen students were selected from the eighth grade population based on enrollment in basic or honors level core classes and gender. A wide range of academic performance and balance of males and females were considerations for choosing participants. Twelve teachers of eighth grade core subjects (math, social studies, science, and communication arts) were selected. The selection of core teachers was based on the assumption that core teachers would be more apt to integrate technology in their daily instruction, than perhaps teachers in the arts or physical education. Participants were selected based on availability and willingness to be interviewed. Responses from face-to-face interviews, field notes, and national survey results from the Speak Up 2008 technology survey were utilized to triangulate the data.

Summary of the Findings

The transcripts from the interviews and field notes were analyzed to determine categories and themes. Three overarching themes were evident from the data for the study: communication is the primary use of technology; students typically feel more knowledgeable about technology and use it more often than teachers; and technology is primarily used as a visual tool, rather than an interactive resource in the classroom. The following research questions guided the study:

1. In what manner do eighth grade students and teachers use technology in their everyday lives?

2. How do students and teachers envision using technology in the classroom?

3. What barriers do students and teachers perceive as reasons for limited technology use in the classroom?

Conceptual underpinnings of the theories of multiple intelligences, differentiated instruction, and best instructional practices based on constructivism were used to support the findings. Pertinent information contained in the review of literature such as generational differences and the need for high quality staff development were used to address each of the research questions.

Research Question 1. In what manner do eighth grade students and teachers use technology in their everyday lives?

Technology is more than just a combination of hardware and software, or a new gadget. Fitzgerald (2002) defined technology "as the application of knowledge and resources to meet human needs" (p. 20). Thus, technology has been part of our society for thousands of years. Goffe and Sosin (2005) listed the trends in educational technology for

the 21st Century: data projectors, PowerPoint, wireless handheld PDAs, tablet PCs, electronic interactive whiteboards, and the Internet. Participants in the study listed cell phones, computers, and iPods as the most commonly used digital devices used outside of school. Student 12(FB) replied, "I don't really spend that much time on technology, so I don't figure it all out. Unless it is my cell phone, and I know everything about my cell phone." Teacher E(F19) expressed her use of technological devices, "I have a cell phone, and I text. I am not very fast, but I text to keep up with my teenagers. I like to see what is going on with my kids."

The common themes of using technology for communication and the perception students are more knowledgeable of technology and use it more often emerged from the study. Teachers and students used cell phones, social networking, and web tools to communicate in school and at home. Generational differences as noted by Lovely (2008) and Mullan (2008) impact the amount of time spent using technology and the reliance upon digital devices.

Research Question 2. How do students and teachers envision using technology in the classroom?

Tapscott (2009) suggested that students do not marvel at technology because it is so much of their daily lives. Tapscott (2009) reported today "100 percent of American schools provide internet access and it is estimated that there is a computer for every four schoolchildren in America" (p. 17). It has been a slow and constantly growing process. Digital natives do not see technology as something new, rather like the air (Tapscott, 2009). Technology is present, but not necessarily remarkable to this generation because they have assimilated to its use.

Marzano (2001) and Gardner (1993) encouraged teachers to implement best instructional practices such as teaching students to classify and providing immediate feedback; along with differentiating instruction to meet the multiple intelligences of learners. Smith Junior High teachers desired to be effective in their instruction, but were cautious of using tools such as cell phones and iPods to differentiate for various learning styles. Technology integration was viewed as more use of visual tools in the classroom, rather than providing opportunities for students to create multi-media projects or use the Internet to research real world situations. Matzen and Edmunds (2007) concluded, "In some situations, technology can actually promote more constructivist-instruction. In other cases, it simply supports the existing instruction" (p. 428). Smith Junior High teachers used technology to support existing instructional practices; rather than embracing a constructivist-instructional approach.

Smith Junior High students and teachers agreed that having more computers, perhaps one-to-one computers for students as being the most needed resource for the classroom. Classroom projection devices and Smart Boards were also assumed to be part of an effective technology integrated classroom. Students desired use of mobile devices such as MP3 players and cell phones in the classroom more than teachers. Teacher E(F19) explained educators' concerns with cell phones in the classroom:

> I don't guess I know how they [students] would use them [cell phones] for learning. I know how they use them for cheating. I wouldn't have a problem with them listening to music, but afraid of them using cell phones. How would I know if they are learning or socializing? At this grade level I would be very reluctant. They wouldn't make good choices.

Most of the student participants were also hesitant about the use of cell phones in the classroom. Student 1(MH) described possible cell phone misuse, "You can download podcasts that can help you learn. I don't really know about the cell phone thing. Students may do more texting and cheating and that would not be beneficial at all."

Smith Junior High teachers' responses focused more on equipment and using the technology tools to present information. Smith Junior High students were mostly interested in being involved with technology in the form of more online projects, creating things with computers, and socializing online. Facebook and YouTube were the most commonly accessed web 2.0 tools by students.

Research Question 3. What barriers do students and teachers perceive as reasons for limited technology use in the classroom?

Richardson (2008) stated, "One of the biggest challenges educators face right now is figuring out how to help students create, navigate, and grow the powerful, individualized networks of learning that bloom on the Web and helping them do this effectively, ethically, and safely" (pp. 17-18). Levin and Wadmany (2008) studied "many factors that hinder effective use of technology in the classroom: lack of convenient access to computers, inadequate infrastructure, poor planning for the use of technology, limited or inadequate professional development, lack of time, lack of ongoing support, and poor leadership knowledge" (p. 263).

Hoyer (2010) surmised teachers need to understand the gap between themselves and students and that technology has been in schools for more than twenty years, even though educators persistently think of it as new. Training should involve how to use the technology and research based instructional practices. Technology is no longer used

simply for students to gain or manage information, but it opens a whole new world of possibilities for learning and participating.

Smith Junior High teachers perceived a lack of access to be a major barrier to technology use and integration; whereas, Smith Junior High students viewed blocked websites as a major obstacle. Smith Junior High students were bothered by slow Internet access, but teachers did not prioritize Internet use as a major obstacle. Teacher E(F18) expressed frustrations with technology usage:

> We don't have enough labs and the computers are slow. The printers are old. It is so worrisome because something can always go wrong. Even the mobile lab, you have to switch the batteries. There's just little glitches that make you leery, otherwise you have eighth graders without something to do.

Teacher M(F9) viewed obstacles in another way:

> If your lightbulb goes out [on your projector], you panic because you don't know what to do. It [being without a projector] is an obstacle. Becoming dependent on it can be an obstacle. Sometimes things don't go the way you plan it to go. Being able to keep up [is an obstacle]. The kids are used to it. I am trying really hard. I want to give them as much as I can.

Thirty-eight percent of the students did not acknowledge any barriers or obstacles to technology use in their school. The most common barrier, as perceived by 25% of students, was blocking of websites by school filters or firewalls. Student 3(FB) reported, "They don't let us go to the same sites that I can go to at home. The computers at school are not as fast as my computer at home."

A summary of findings identified use of technology devices in the everyday lives of students and teachers as being mainly computers and cell phones. Also, teachers viewed technology integration as the use of projection devices and visual presentations such as PowerPoint. However, students envisioned technology use as allowing online projects, creation of products, research and socializing online. Lastly, this study identified lack of access to computers, blocked websites, and slow Internet service as barriers to technology use and integration.

Limitations of the Study

This case study was limited to the target population of eighth grade students and teachers of eighth grade students in a southwest Missouri public school district. The use of Speak Up Project 2008 data limited the survey results to 281,000 students and 28,000 teachers participating in the national survey. Interviews were limited to16 students and 12 teachers selected from a southwest Missouri public junior high school for the purpose of gaining local perspectives. Students were selected based on their enrollment in basic or honors level classes; as well as gender. Teachers were selected based on their teaching positions in core eighth grade classes: math, social studies, science, and communication arts.

Conclusions

Bounded within the context of sixteen eighth grade students and twelve core teachers of eighth grade students in a selected junior high school in southwest Missouri and the limitations of the study, the perceptions and use of technology by eighth grade students and teachers were examined. Three themes emerged from the study in response to the research questions: communication is the focus of technology use, students

consider themselves more knowledgeable about technology than teachers, and technology use in the classroom is primarily a visual tool, rather than an interactive resource.

Students considered themselves to be advanced or average technology users based on the amount of time they spent using computers and other technology devices. Teachers did not see themselves as knowledgeable about technology. All of the students had access to computers and Internet at home. Only 83% of teachers had access to computers and Internet at home. Due to the fact that students spend more time using technology outside of school and their access to computers, they appear to be more technologically savvy. The use of cell phones is prevalent among students and teachers, even though it is not used for educational purposes. Students use more web 2.0 tools outside of school, with Facebook and YouTube being the most common way to communicate and socialize with others. Teachers still use email more prevalently for communication. Mullen and Wedwick (2008) surmised, "Being literate no longer only involves being able to read and write. The literate of the twenty-first century must be able to download, upload, rip, burn, chat, save, blog, Skype, IM, and share" (p. 66). Smith Junior High students were perceived as digitally literate, yet teachers were not considered to be technologically literate.

Teachers viewed the use of projection devices, video clips, and PowerPoint presentations as forms of technology integration most commonly used in their classrooms. Students recognized that teachers utilized Smart Boards, Airliners, and projection systems most often for instruction. Students noted they used technology to type assignments and research most often to complete schoolwork.

Smith Junior High teachers used technology to assist their existing instructional approaches. Teachers did not change their instructional approach to provide a more constructivist learning environment. Neo (2007) stated, "Constructivism is a student-centered instructional model" (p. 150). Neo explained, "The teacher is no longer perceived as the sole authority, but rather as the facilitator of learning, guiding and supporting learners in the process of constructing knowledge" (p. 151). Smith Junior High teachers and students did not use technology in a constructivist approach. Students and teachers of the case study do not take full advantage of the creation of new products or completion of online projects. It appears that a true understanding of constructivism and 21st Century skills is lacking within the selected school.

The Partnership for 21st Century skills is advocating for educators and students to consider the implications of skills beyond the basic subject areas (DiScipio, 2008). The 21st Century Framework outlines the skills, knowledge, and expertise students will need to succeed in their personal and professional lives (Johnson, 2009). The findings suggest the participants are only using technology integration for basic content and skill acquisition.

Both students and teachers perceive the lack of access to computers to be the number one obstacle for technology use in the school. Students noted blocked websites to be a barrier also. Overall, the teachers and students were positive about the technology, training, and support available in the district. The desire for more computer labs, one-to-one laptops for students, and ongoing training were suggestions for removing the barriers.

Recommendations for Future Research

The findings of this study present a very positive and favorable look at technology use of eighth grade students and teachers at Smith Junior High School. Overall the students and teachers are pleased with the technology use and accessibility available at school. The teachers and students use certain web 2.0 tools outside of school such as YouTube and Facebook, more often than the participants of the Speak Up 2008 survey.

However, during the course of conducting this study, several questions and concerns arose. First, how do teachers and students develop their understanding of technology integration? Why was technology most commonly looked upon as what the teacher used for instruction? Why were teachers not more concerned with using technology at a higher level of engagement? A longitudinal, qualitative study, with classroom observations based on in-depth professional development of proper technology integration may appropriately address these questions.

Secondly, why were so few students creating their own videos, podcasts, and multimedia products outside of school? How do students spend their free time at home? Are more students involved with extracurricular activities, and thus do not have time to spend with technology applications? A survey of the entire eighth grade student population at the selected school may provide answers to these questions.

Implications for Practice

Professional development providers are obliged to develop an understanding of technology integration based on instructional best practices, constructivism, and inquiry-based teaching among teachers. Administrators should realize that providing equipment does not equate to best instructional practices. School boards and administrators must

recognize that accessibility to computers and Internet access is crucial to meeting the needs of today's learners. Providing an appropriate number of computers makes learning more motivational for students. Technology support staffs must make policies that allow as much access to Internet tools as possible, without sacrificing safety of students.

Further research may yield findings regarding why technology integration continues to be a challenge for educators. Through ongoing professional development, use of technology outside of school, and removal of perceived barriers teachers will have the understanding and skills to mirror the technology use available outside the school walls.

Summary

The case study of one junior high school in southwest Missouri provided a snapshot into the perceptions of eighth grade students and teachers regarding technology. Sixteen students and twelve teachers shared thoughts and feelings of their own utilization and frustration with technology inside and outside the classroom. Overall, students and teachers employed technology to the best of their understanding to enrich their lives and classrooms. Both students and teachers had concerns regarding technology tools and overuse of digital tools.

The interview responses, field notes, and survey results from Speak Up 2008 provided data which enhanced the study. It was assumed participants answered honestly and sincerely during the interviews. As a result of the study, teachers, administrators, and professional development providers may enhance instructional best practices including: constructivism, theory of multiple intelligences, and differentiation of instruction. Recognizing a digital divide between students and teachers can exist due to generational

differences may allow teachers to improve instruction and engage learners. Priorities for technology budgeting may be constructed based on the findings. Further study of students and teachers may assist in understanding the trends of students and teachers in regards to their personal use of technology tools; and thus their impact in classroom technology integration moving from traditional teaching approaches to a constructivist model of instructional practice.

Appendix A

LINDENWOOD UNIVERSITY
Institutional Review Board Disposition Report

To: Lori Elliot
Sherry DeVore

Study title: *Student and Teacher Perspectives of Technology Usage*

The IRB has reviewed your revised application for research, and approved it.
However, we have one minor concern we ask that you address/clarify with your dissertation chair.

This concern is with the following statement:

9 (d): "Student participants will be selected *based on gender* and enrollment in either basic or honors level core classes." As far as I can tell, this is the only reference to "gender" in the application, What is the significance of this? Are you limiting the research to students based on gender? If so, why?

Jeanie Thies
            5/12/10
Institutional Review Board Chair   Date

Appendix B

Permission to Use Speak Up Data

Organization Name	Nixa Public Schools				
Contact:	Lori Elliott				
Mailing Address	297 S. Main Street				
City	Nixa	**State**	MO	**Zip**	65714
Email address	lorielliott@nixaschools.net	**Phone**	417-875-5416		
Speak Up Years	**2008**	**Usage**	Dissertation in Instructional Leadership		
When will data be published:	May, 2010				

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> **Use standard APA Citation standards when referencing Speak Up data. Cite the year of the Speak Up Survey (e.g. Speak Up 2005-2007) and attribute the source as Project Tomorrow.**

We respectfully request that you send us a link to or copy of your published materials within 30 days of the publication date. If you have questions regarding your use of the materials, please contact us at any time.

Julie Evans
Chief Executive Officer

15707 Rockfield Blvd. Ste 330 ₃ **Irvine, CA 92618** ₃ **949 609-4660** ₃ **www.tomorrow.org**

Appendix C

Lindenwood University
School of Education
209 S. Kingshighway
St. Charles, Missouri 63301

PERMISSION LETTER – SCHOOL DISTRICT

May 13, 2010

Dear,

   I am conducting a research study titled, *Student and Teacher Perspectives of Technology Usage,* in partial fulfillment of the requirement for a doctoral degree in instructional leadership at Lindenwood University. The research gathered should assist in providing insight into how eighth grade students and teachers of eighth grade students perceive and use technology for learning and daily tasks. The findings may serve to help educators provide professional development opportunities, prioritize budget resources, and increase student achievement.
   For the study, sixteen eighth grade students will be interviewed about their use and perceptions of technology. The students will be both male and female and will be selected from basic and honors level courses. The teachers of eighth grade students will be selected due to their teaching assignments in core subject areas (math, social studies, science, and communication arts). Twelve teachers will be interviewed and asked the same questions as the students.
   I am seeking your permission as the superintendent of the District to contact the principal and the core subject eighth grade teachers of the building for the purpose of inviting the teachers to participate in this study. I will contact the students by phone calls to parents, email, and letters.
   Each student and teacher will be asked respond to 10 interview questions. The interviews will be audio-taped in order to accurately transcribe the responses. A copy of the interview protocol and informed consent letters are attached for your review.
   Participation in the study is completely voluntary. The participants may withdraw from the study at any time without penalty. The identity of the participants and school district will remain confidential and anonymous in the dissertation or any future publications of this study.
   Please do not hesitate to contact me with any questions or concerns about participation (phone: (417) 725-0253 or e-mail lle948@lionmail.lindenwood.edu). You may also contact the dissertation advisor for this research study, Dr. Sherry DeVore, (phone: 517-881-0009 or e-mail sdevore@lindenwood.edu). A copy of this letter and your written consent should be retained by you for future reference.
Yours truly,
Lori Elliott
Doctoral Candidate

PERMISSION LETTER – SCHOOL DISTRICT

I, _____, grant permission for the _____ school district to

be contacted regarding participation in the study of *Student and Teacher Perspectives of*

Technology Usage by Lori Elliott. By signing this permission form, I understand that the

following safeguards are in place to protect students and teachers who choose to

participate:

1. The participants may withdraw from the study at any time without penalty.

2. The identity of the participants and school district will remain confidential and
   anonymous in the dissertation or any future publications of this study.

I have read the information above, and any questions that I have posed have been

answered to my satisfaction. I grant permission for the eighth grade students and teachers

at the building to be contacted and invited to participate in this study.

_____   _____
Superintendent's Signature   Date

Appendix D

Letter of Introduction

April 22, 2010

Title: First Name, Last Name
Position
School District
Address

Dear Title, First Name, Last Name,

Thank you for participating in my research study. I look forward to meeting with you on Date, Time to gather your perceptions and insights about the use and integration of technology in your daily life and for learning.

I have allotted 1 hour to conduct the interview. Additionally, I will be videotaping the interview to ensure accuracy of your responses.

Enclosed are the interview questions to allow time for reflection before our interview. I have also enclosed the Informed Consent Form for your review and signature. Your participation in this research study is voluntary and you may withdraw at any time. Confidentiality is assured. If you have questions, please call or send an e-mail (417)725-0253 or lle948@lionmail.lindenwood.edu.

Sincerely,

Lori Elliott
Doctoral Candidate
Lindenwood University

Appendix E

Interview Questions

1) What type of technology user are you? Advanced, average, or beginner?

2) What types of electronic devices do you use in your daily life?

3) What kind of computer or Internet access do you have outside of school?

4) Students: How do you use technology for schoolwork?
   Teachers: How do you use technology to facilitate student learning?

5) What are some major obstacles to using technology in your school?

6) Would mobile devices such as cell phones or MP3 players help with schoolwork?
   If so, how?

7) How could your school make it easier for you to work electronically?

8) If you could design a new type of online textbook, what would you include?

9) How do you use Web 2.0 tools outside of school?

10) Imagine you were designing the ultimate school. What would you include to have
   the greatest impact on your learning?

11) How much do you rely on technology in your daily life?

12) Overall comments and thoughts about technology.

Appendix F

Lindenwood University
School of Education
209 S. Kingshighway
St. Charles, Missouri 63301

INFORMED CONSENT FOR PARENTS TO SIGN FOR STUDENT PARTICIPATION IN RESEARCH ACTIVITIES

"Student and Teacher Perspectives of Technology"

Primary Investigator: Lori Elliott   Telephone: 417-725-0253
                                        E-mail: lle948@lionmail.lindenwood.edu

Participant _____Parent Contact Information_____

1.   Your child is invited to participate in a research study conducted by Lori Elliott under the supervision of Dr. Sherry DeVore. The purpose of this study is to examine perceptions of eighth grade students and teachers in a southwest Missouri school district regarding technology. This study will explore possible barriers to technology integration in classroom instruction and student participation. This study will also examine how teachers and eighth grade students envision technology usage in an instructional setting.

2. a) Your child's participation will involve:
   ➢ An hour long videotaped interview with the primary investigator, Lori Elliott. With your permission, the interview will be videotaped to assure your child's responses are transcribed accurately.

   *I give my permission to videotape the interview with my child. [Parent's initials: _____].

   ➢ The interview questions are attached to this consent form.

   Approximately sixteen (16) students and twelve (12) teachers may be involved in this research.

   b) The amount of time involved in your child's participation will be one hour.

3. There are no anticipated risks to your child associated with this research.

4. There are no direct benefits for your child's participation in this study. However, your child's participation will contribute to the knowledge about student and teacher perceptions of the use of technology, may help higher education and trainers to better equip teachers for today's classrooms, and prioritize funding for future technologies.

5. Your child's participation is voluntary and you may choose not to let your child participate in this research study or to withdraw your consent for your child's participation at any time. Your child may choose not to answer any questions that he or she does not want to answer. You and your child will NOT be penalized in any way should you choose not to let your child participate or to withdraw your child.

6. We will do everything we can to protect your child's privacy. As part of this effort, your child's identity will not be revealed in any publication or presentation that may result from this study. The videotapes, transcripts, and documents will be secured in a locked cabinet in the possession of the primary investigator for three years following the completion of the study and then destroyed.

7. If you have any questions or concerns regarding this study, would like to receive a copy of the study findings, or discuss any problems that might arise, you may call the primary investigator, Lori Elliott, at 417-725-0253 or her faculty advisor, Dr. Sherry DeVore, at 417-881-0009.

   You may also ask questions of or state concerns regarding your child's rights as a research participant to the Lindenwood Institutional Review Board (IRB) by contacting Dr. Jann Weitzel, Vice President for Academic Affairs, at 636-949-4846.

   I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records.

   I consent to my child's participation in the research described above.

   _____   _____
   Parent's/Guardian/s Signature   Date   Parent's/Guardian's Printed Name

   _____
   Child's Printed Name

   _____   _____
   Signature of Investigator   Date   Investigator's Printed Name

Lindenwood University

School of Education

209 S. Kingshighway
St. Charles, Missouri 63301

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH
ACTIVITIES

"Student and Teacher Perspectives of Technology"

Primary Investigator : Lori Elliott   Telephone: 417-725-0253
                                        E-mail: ll3948@lionmail.lindenwood.edu

Participant _____Contact Information _____

       You are invited to participate in a research study conducted by Lori Elliott under
the supervision of Dr. Sherry DeVore. The purpose of this study is to examine
perceptions of eighth grade students and teachers in a southwest Missouri school district
regarding technology. This study will explore possible barriers to technology integration
in classroom instruction and student participation. This study will also examine how
teachers and eighth grade students envision technology usage in an instructional setting.

2. a) Your participation will involve:
   ➢ An hour long videotaped interview with the primary investigator, Lori Elliott.
     With your permission, the interview will be videotaped to assure your responses
     are transcribed accurately.

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Approximately sixteen (16) students and twelve (12) teachers may be involved in this
research.

3. There are no anticipated risks associated with this research.

4. There are no direct benefits for you participating in this study. However, your
participation will contribute to the knowledge about student and teacher perceptions
of the use of technology, may help higher education and trainers to better equip
teachers for today's classrooms, and prioritize funding for future technologies.

5. Your participation is voluntary and you may choose not to participate in this research study or to withdraw your consent at any time. You may choose not to answer any questions that you do not want to answer. You will NOT be penalized in any way should you choose not to participate or to withdraw.

6. We will do everything we can to protect your privacy. As part of this effort, your identity will not be revealed in any publication or presentation that may result from this study. The videotapes, transcripts, and documents will be secured in a locked cabinet in the possession of the primary investigator for three years following the completion of the study and then destroyed.

7. If you have any questions or concerns regarding this study, would like to receive a copy of the study findings, or discuss any problems that might arise, you may call the primary investigator, Lori Elliott, at 417-725-0253 or her faculty advisor, Dr. Sherry DeVore, at 417-881-0009.

   You may also ask questions of or state concerns regarding your rights as a research participant to the Lindenwood Institutional Review Board (IRB) by contacting Dr. Jann Weitzel, Vice President for Academic Affairs, at 636-949-4846.

   I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

Participant's Signature   Date   Participant's Printed Name

Signature of Principal Investigator   Date   Investigator Printed Name

References

Abbott, J. & Ryan, T. (1999). Constructing knowledge, reconstructing schooling. *Educational Leadership*, *57*(3), 66-69.

Allen, R. (2010). *High-Impact teaching strategies for the "XYZ" era of education*. Boston, MA: Allyn & Bacon.

Annual Report Card. (2010). School statistics and news updates. Retrieved from http://dese.mo.gov/schooldata/

Azzam, A. (2006). Digital opportunity. *Educational Leadership*, *63*(4), 89-92.

Beyers, R. (2009). A five dimensional model for educating the net generation. *Educational Technology & Society, 12*(4), 218-227.

Boss, S. & Krauss, J. (2007). Power of the mashup. *Learning and Leading with Technology, 35*(1), 12-17.

Brown, G. (2005). Preparing a qualitative research-based dissertation: Lessons learned. *The Qualitative Report, 10*(2), 208-222.

Bower, J. (2010). Enough hardware, already. Retrieved from http://www.eschoolnews.com

Callary, J. (2008). A glimpse into one 1970's textbook. *Tech Trends, 52*(5), 15.

Concept to Classroom. (2010). Constructivism. Retrieved from http://www.thirteen.org/edonline/concept2class/constructivism/index.html

Creswell, J.W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.

Creswell, J.W., Hanson, W., Plano, V., & Morales, A. (2007). *Qualitative research designs: Selection and implementation*. Thousand Oaks, CA: Sage.

Creswell, J.W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom.* Cambridge: Harvard University Press.

Davis, P. (2010). From proposed to implemented program. Retrieved from http://www.eschoolnews.com

Department of Education. (2010). Transforming American education: Learning powered by technology. Retrieved from www.ed.gov/technology

Devaney, L. (2010). Digital access, collaboration a must for students. Retrieved from http://www.eschoolnews.com

DiScipio, T. (2008). Adapting social networking to address 21st century skills. *Multimedia & Internet @Schools Magazine.* Retrieved from www.mmischools.com

Doe, C. (2010). Interactive whiteboards. *Multimedia and Internet in Schools, 17*(1), 30-34.

Dorman, S. (2001). Teaching our first digital generation. *The Education Digest, 66*(8), 30-32.

Duncan, A. (2010). Using technology to transform schools. Retrieved from www.2ed.gov/print/news/speeches/2010/03/03032010.html

Earle, R. (2002). The integration of instructional technology into public education: Promises and challenges. *ET Magazine, 42*(1), 5-13.

Edutopia Staff. (2008). Why integrate technology into the curriculum: The reasons are

    many. *Edutopia*. Retrieved from http://www.edutopia.org/technology-integration-

    introduction

Ely, D. (2008). Frameworks of educational technology. *British Journal of Educational*

    Technology, 39(2), 244-250

eMINTS National Center (2010). History of eMINTS. Retrieved from

    http://www.emints.org

Ferriter, B. (2009). Taking the digital plunge. *Educational Leadership, 67*(1), 85-86.

Fingal, D. (2009). Ahead of his time. *Learning and Leading with Technology, 36*(5),

    26-29.

Fitzgerald, M. (2002). The evolution of technology. *Tech Directions, 61*(7), 20-24.

Fletcher, G. (2008). Separation anxiety. *T.H.E. Journal, 35*(12), 6-6.

Fogarty, R. (1999). Architects of the intellect. *Educational Leadership*, *57*(3), 76-78.

Food and Nutrition Service. (2010). National school lunch program. Retrieved from

    http://www.fns.usda.gov/cnd/lunch/

Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences.* New York:

    Basic Books.

Gardner, H. (2000). Can technology exploit our many ways of knowing? *In The Digital*

    Classroom (32-34). Harvard Education Letter.

Gardner, H. (2009). A new frame of mind. *Edutopia*, *5*(2), 32-33.

Gasser, U. & Palfrey, J. (2009). Mastering multitasking. *Educational Leadership,*

    66(6), 15-19.

Gee, J. & Levine, M. (2009). Welcome to our virtual worlds. *Educational Leadership*, *66*(6), 48-52.

Gerdes, D. & Conn, J. (2001). A user friendly look at qualitative research methods. *The Physical Educator 58*(4), 183-190.

Gewertz, C. (2007). Outside interests. *Education Week, 26*(30), 24-27.

Goffe, W., & Sosin, K. (2005). Teaching with technology: May you live in interesting times. *Journal of Economic Education, 36*(3), 278-291.

Green, J., Camilli, G., & Elmore, P. (2006). *Handbook of complementary methods in education research*. American Educational Research Association.

Groff, J. & Haas, J. (2008). Web 2.0 today's technologies, tomorrow's learning. *Learning & Leading with Technology*, *36*(2), 12-15.

Hart, P. (2007). How should colleges prepare students to succeed in today's global economy? Retrieved from www.aacu.org/advocacy/leap

Hirsch, S. (2006). NSDC standards provide a richer definition of professional development than does NCLB. *Journal of Staff Development*, *27*(3), 59-60.

Hoepfl, M. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education, 9*(1), 1-11.

Hooper, S., & Rieber, L.P. (1995). *Teaching with technology. Teaching: Theory into practice*. Needham Heights, MA: Allyn & Bacon.

Hooper, S., & Rieber, L.P. (1999). *Teaching, instruction, and technology*. Boston, MA: Allyn & Bacon.

Hoyer, R. (2010). A look at the technology culture divide. Retrieved from http://www.eschoolnews.com

Hunt, O. (2007). A mixed method design. Retrieved from

    http://www.articlesbase.com/education-articles/a-mixed-method-design-

    177933.html

Jayson, S. (2010, February 10). iGeneration has no off switch. *USA Today*. Retrieved

    from www.usatoday.com

Jensen, E. (2008). A fresh look at brain-based education. *Phi Delta Kappan, 89*(6).

    Retrieved from http://www.pdkintl.org/kappan/k_v89/k0802jen.htm

Johnson, P. (2009). The 21st century skills movement. *Educational Leadership*, *67*(1), 11.

Johnson, R., & Onwuegbuzie, A. (2004). Mixed methods research: A research paradigm

    whose time has come. *Educational Researcher, 33*(7), 14-26.

Johnson, W. (2008). Making learning easy and enjoyable: Anna Verona Dorris and the

    visual instructional movement. *Tech Trends, 52*(4), 51-58.

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is

    there a connection? *Journal of Technology and Teacher Education, 14*(3),

    581-597.

Kennedy, M. (1999). A century of progress. *American School & University, 72*(4), 10-12.

Kerwood, R. (2009). Constructivism. Retrieved from http://www.emints.org

Klinkefus, M. (2009). 8th grade technology literacy. Retrieved from

    http://www.aea1.k12.ia.us/technology/techliteracy.html

Kolikant, Y. (2009). Digital students in a book-oriented school: Students' perceptions of

    school and usability of digital technology in schools. *Educational Technology &*

    Society, 12(2), 131-143.

Kvavik, R. (2005). Convenience, communications, and control: How students use

    technology. *Educating the Net Generation*. Retrieved from

    http://www.educause.edu/educatingthenetgen/

Levin, T., & Wadmany, R. (2008). Teachers' views on factors affecting effective

    integration of information technology in the classroom: Developmental scenery.

    Journal of Technology and Teacher Education, 16(2), 233-263.

Li, Q. (2007). Student and teacher views about technology: A tale of two cities. *Journal

    of Research on Technology in Education*, *39*(4), 377-397.

Lovely, S. (2008). Generations at school: Managing the cross-age divide. *Leadership, 38*

    (1), 8-9.

Lumpe, A., & Chambers, E. (2001). Assessing teachers' context beliefs about technology

    use. *Journal of Research on Technology in Education, 34*(1), 93-107.

Manthey, G. (2000). Technology's miracles: Now relics. *Leadership, 30*(1), 1.

Manzo, K. (2009). Students see schools inhibiting their use of new technologies.

    Education Week, 28(27), 10-10.

Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works:*

    Research- based strategies for increasing student achievement. Alexandria, VA:

    Association for Supervision and Curriculum Development.

Marzano, R. (2009). Teaching with interactive whiteboards. *Educational Leadership,*

    67(3), 80-82.

Mason, C. (2005). The future of technology in schools. *Principal Leadership, 5*(8),

    46-52.

Matzen, N. & Edmunds, J. (2007). Technology as a catalyst for change: The role of

    professional development. *Journal of Research on Technology in Education,*

    39(4), 417-430.

Means, B. (2001). Technology use in tomorrow's schools. *Educational Leadership,*

    58(4), 57-61.

Melillo, A. (2008). History of educational technology. Retrieved from

    http://keep3sjfc.edu/students/ammo07332/e-port/231/historyofedtech.pdf

Merriam, S. (2009). *Qualitative research: A guide to design and implementation.*

    San Francisco, CA: Jossey-Bass.

Mishra, P. & Koehler, M. (2009). Too cool for school-no way: Using the TPACK

    framework you can have hot tools and teach with them too. *Learning and Leading*

    with Technology, 36(7), 14-18.

MODESE. (2010). News and updates. Retrieved from http://dese.mo.gov/index.html

Mullan, E. (2008). The generational divide: World of work survey encourages

    collaboration. *EContent, 31*(9), 16-17.

Mullen, R. & Wedwick, L. (2008). Avoiding the digital abyss: Getting started in the

    classroom with YouTube, digital stories, and blogs. *The Clearing House, 82*(2),

    66-69.

National Staff Development Council. (2001). NSDC's standards for staff development.

    Retrieved from http://www.nsdc.org/standards/

National Technology Plan. (2010). Transforming American education: Learning powered

    by technology. Retrieved from http://www.ed.gov/sites/default/files/NETP-2010-

    final-report.pdf

Neo, M. (2007). Learning with multimedia: Engaging students in constructivist learning. *International Journal of Instructional Media*, *34*(2), 149-158.

Neo, M. & Neo, T. (2009). Engaging students in multimedia-mediated Constructivist learning: Students' perceptions. *Educational Technology & Society, 12*(2), 254-266.

No Child Left Behind. (2009). Retrieved from http://www2.ed.gov/policy/elsec/leg/esea02/index.html

November, A. (2010). *Empowering students with technology*. Thousand Oaks, CA: Corwin.

Nussbaum-Beach, S. (2008). No limits. *Technology and Learning, 28*(7), 14-18.

O'Donovan, E. (2009). Managing generational diversity. *District Administration, 45*(8), 68-71.

Palfrey, J., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York, NY: Basic Books.

Partnership for 21st Century Skills. (2010). Framework for 21st century learning. Retrieved from http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=120

Pascopella, A. (2008). A push for sustainable teacher learning. *District Administration, 44*(13), 12-12.

Pink, D. (2006). *A whole new mind*. New York: Penguin Group.

Pink, D. (2009). *Drive:The surprising truth about what motivates us*. New York: Penguin Group.

Pitler, H., Hubbell, E., Kuhn, M., & Malenoski, K.. (2007). *Using technology with classroom instruction that works*. Alexandria, VA: ASCD.

Plair, S. (2008). Revamping professional development for technology integration and fluency. *Clearing House, 82*(2), 70-74.

Prawd, L. (1996). Are our children ready for the future? A look at technology in education. *International Journal of Instructional Media, 23*(3), 281-188.

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

Prensky, M. (2001b). Do they really think differently. *On the Horizon, 9*(6), 1-9.

Prensky, M. (2005). Listen to the natives. *Educational Leadership, 63(*4), 8-13.

Prensky, M. (2008). Adopt and adapt: Shaping tech for the classroom. *Edutopia*, Retrieved from http://www.edutopia.org/adopt-and-adapt

Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, CA: Corwin.

Project Tomorrow. (2009). Learning in the 21st century. Retrieved from http://www.tomorrow.org/speakup/speakup_reports_archive2008.html

Project Tomorrow. (2010). Creating our future: Students speak up about their vision for 21st century learning. Retrieved from http://www.tomorrow.org/speakup/pdfs/SU09NationalFindingsStudents&Parents. pdf

Protheroe, N. (2008). Teacher efficacy: What is it and does it matter. *Principal, 87* (5), 42-45.

Rakes, G., Fields, V., & Cox, K. (2006). The influence of teachers' technology use on instructional practices. *Journal of Research on Technology in Education, 38*(4), 409-424.

Richardson, W. (2008). Footprints. *Educational Leadership, 66*(3), 16-19.

Rosen, L. (2010). *Rewired: Understanding the iGeneration and the way they learn*. New York, NY: Palgrave & Macmillan.

Rotherham, A. & Willingham, D. (2009). 21st century: The challenges ahead. *Educational Leadership, 67*(1), 16-21.

Schwartz, N. (2008). Exploiting the use of technology to teach: The value of distributed cognition. *Journal of Research on Technology in Education*, *40*(3), 389-404.

Solomon, G., & Schrum, L. (2007). *Web 2.0: New tools, new schools*. Eugene, OR: ISTE.

Speak Up (2009). Selected national findings 2008. Retrieved from http://www.tomorrow.org/Speakup/

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

Sprenger, M. (2010). *Brain based teaching in the digital age*. Alexandria, VA: ASCD.

Tapscott, D. (2009). Grown up digital. New York: McGraw Hill.

Taranto, G., & Abbondanza, M. (2009). Powering students up. *Principal Leadership*, *10*(4), 38-42.

T.H.E. Journal. (2009). Teacher tech use stuck in the past. *T.H.E. Journal, 36*(4), 12-12.

Toffler, A. (1980). *The third wave*. New York: Bantam Books.

Tomlinson., C. & Kalbfleisch, M. (1998). Teach me, teach my brain: A call for differentiated classrooms. *Educational Leadership, 56*(3), 52-55.

Trilling, B., & Fadel, C. (2009). 21st century skills: Learning for life in our times. San Francisco: Jossey-Bass.

Twenge, J. (2006). *Generation me*. New York: Free Press.

21st Century Skills (2009). Retrieved from http://www.21stcenturyskills.org

Vockley, M. (2007). Beyond the three Rs: Voter attitudes toward 21st century skills. Retrieved from www.21stcenturyskills.org

Williams, P. (2008). Leading schools in the digital age: A clash of cultures. *School Leadership and Management, 28*(3), 213-228.

Willis, S., & Mann, L. (2000). *Differentiating instruction: Finding manageable ways to meet individual needs*. Retrieved from www.ascd.org/ed_topics/cu2000win_willis.html

Wolpert, H. (2009). *The sweet-spot in interactive whiteboards courtesy of Robert Marzano*. Retrieved from http://tweenteacher.com/2009/03/09/the-sweet-spot-in-interactive-whiteboards-courtesy-of-robert-marzano/

Woo, Y., & Reeves, T. (2007). Meaningful interaction in web-based learning: A social constructivist interpretation. *Internet and Higher Education, 10*, 15-25.

Yin, R. (2009). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.

Vita

Lori Ferguson Elliott was born on March 3, 1968, in Decatur, Georgia. Following graduation from Kickapoo High School in Springfield, Missouri, in 1986, Mrs. Elliott attended Baylor University in Waco, Texas and Southwest Missouri State University (SMSU) in Springfield, Missouri. Mrs. Elliott graduated from SMSU with a Bachelor of Science degree in Education in 1990 and a Master of Science degree in Reading in 1999. Mrs. Elliott received a Doctorate degree in Instructional Leadership from Lindenwood University in 2010.

Mrs. Elliott has served as an educator in the southwest area of Missouri for 19 years. Professional experiences include the following: Elementary Classroom Teacher, Literacy Coach and Facilitator, Adjunct University Instructor, STARR Teacher for the state of Missouri, National Board Certified Teacher, Professional Development Consultant and Presenter for Staff Development for Educators, and Technology Teacher on Special Assignment (TOSA). Mrs. Elliott currently serves as the district Technology TOSA of Nixa Public Schools.

Mrs. Elliott actively participates in community and church events. She and her husband, Tim, are the parents of two children: Austin (20) and Ashlyn (15). Mrs. Elliott enjoys spending time with her family, reading, learning new technology, and teaching.