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A Mixed Method Study Measuring the Perceptions of Administrators, Classroom Teachers and Professional Staff on the Use of iPads in a Midwest School District

Andrea Laux Beckerle
Lindenwood University

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A Dissertation submitted to the Education Faculty of Lindenwood University

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Dr. Lynda Leavitt, Dissertation Chair — Date

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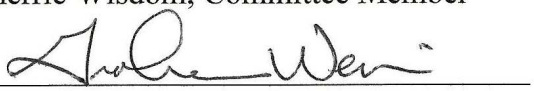
Dr. Sherrie Wisdom, Committee Member — Date



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Dr. Graham Weir, Committee Member — Date

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.

Full Legal Name: Andrea Christine Laux Beckerle

Signature: Andrea Christine Laux Beckerle Date: October 11, 2013

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Abstract

The purpose of this mixed methods study was to assess the perceptions of classroom teachers, administrators and professional support staff in one Midwest school district regarding the usefulness and effectiveness of the iPad device as an instructional and support tool within the classroom. The need to address classroom teacher, administrator and professional support staff perceptions was crucial as the researched school district approved the move to one-to-one student iPad implementation. Quantitative and qualitative data were collected from three role-specific online surveys containing Likert scale and open-ended questions. Qualitative data were collected during face-to-face interviews.

The quantitative data suggested classroom teachers did not perceive the positive effects of the iPad on classroom instruction while professional support staff did perceive the positive effects of the iPad to support classroom instruction. Overlapping themes emerged from the qualitative data sources and the most prominent themes noted: iPad as a job specific tool; iPad as a student tool; and professional development in learning how to utilize the iPad in an educational setting. Additional outlier theme responses included: time, specifically the lack of time in general and the need for time to use the device, and 21st century skills, specifically the absence of responses connecting the iPad to 21st century skills. The researcher presented results from the iPad pilot exit survey secondary data from the study school district. Due to the rapid evolution of technology the need to assess perceptions in an educational setting will continue. The results of this study add to the growing amount of research on mobile technology and educators' perceptions regarding technology implementation.

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Chapter One: Introduction

Educating students to be successful necessitates knowledge of 21st century skills. Trilling (2010) stated that students in the 21st century should be educated for the future; "it helps to first picture what the world might look like 20 years from now" (p. 10). According to Trilling, "Technology is more a part of children's lives each day, so why should they have to check their technology at the classroom door and compete for limited school computer time?" (p. 13).

Technology skills are a component of 21st century skills. "No one sees more clearly than educators how the technologies we use in our daily lives influence how students learn. Students have changed, educators have changed, and learning itself has changed. And learning tools have evolved accordingly" (Stevens, 2011, p. 59). Mobile devices are some of the learning tools found in a 21st century classroom (Stevens, 2011). Apple Corporation (2010) issued a press release before launching its iPad device describing it as "a revolutionary device for browsing the web, reading and sending email, enjoying photos, watching videos, listening to music, playing games, reading e-books and much more" (para. 1). Since the release of the original iPad device three years ago, Apple has introduced the iPad 2, iPad 3, iPad 4 and iPad Mini (Apple, 2012b).

The technology facilitators working within the researched school district identified the iPad device as a concrete symbol of emerging technology. The district's technology facilitator described the district's expectations of the iPad device as:

> It is our belief that students and teachers need access to emerging technology demonstrating sizeable shifts in accessibility with relevant meaningful learning experiences that offer enhanced or even new ways for

> learning to take place. Technology implementation or integration should always begin with the learning goal in mind. Technology is the tool(s) to accomplish learning goals in a more meaningful way with transformative learning always the aim. (District Content Facilitator, personal communication, February 10, 2012)

Background of the Study

The study school district's technology facilitators created the Technology Leadership Group (TLG) during the 2009-2010 school year with the intent to recruit teachers and other certified staff interested in using technology in the classroom to represent their buildings and thus help lead their colleagues in its use to improve instruction. The mission of the TLG provided focus to district staff in decisions on acquiring and learning how to employ classroom technology. Personnel in the study school district viewed the iPad as a technological tool that could provide new opportunities and bridge existing gaps remaining from the use of previous technological tools and devices.

The study school district piloted iPads with the TLG in spring, 2011. During the 2010-2011 school year the district's technology facilitators purchased iPads from the facilitator technology budget and district technology budget. The 48 TLG members throughout the district rotated the 30 iPads for approximately a semester, with each member having an iPad for approximately one quarter. The 2010-2011 TLG group was asked to participate in a pilot program with the goal of determining how effectively the device could function as a teaching and learning tool within classrooms. Budgetary requests across the district were examined as data to support ongoing interest in using the

iPad for instruction leading to the district prioritizing the future purchase of iPads. During the 2011-2012 and 2012-2013 school years each elementary, middle schools, and the high school purchased one iPad cart, with 25 iPads, with building technology funds, Parent Teacher Organization (PTO) funds, or through a grant. The 2011-2012 TLG proposed the replacement of old laptops with new laptops and purchased iPad devices for teachers for the district technology refresh. In the summer of 2012, all teachers received iPad devices to be utilized in their daily professional responsibilities. During December 2012, district personnel visited schools with one-to-one iPad implementation and during February 2013 TLG members received one set of iPad Mini devices to utilize with one section of students. The researched district presented findings to the study school Board of Education during the May 2013 meeting, in which they approved the distribution of iPads throughout the district. Prior to the conclusion of the iPad pilot training program in 2011, the iPad 2 device became available and several schools within the district used discretionary technology funds to purchase and increase their numbers of iPads. Increased availability of the iPad 2 resulted in heightened interest from staff members in the opportunity to become involved with the emerging classroom technology represented by the iPad 2 device. In May 2013, the Board of Education within the study school district approved a one-to-one model to roll out devices in four phases, with the first phase implemented fall of 2013 and the final phase expected in January, 2015.

Purpose of the Dissertation-Problem Statement

The purpose of this study was to ascertain the perceptions of K-12 educators in one Midwestern school district as to the usefulness and effectiveness of the iPad device as an effective classroom instructional tool after the school district's technology

facilitator oversaw a pilot program involving the use of the iPad device as an instructional classroom tool. It became evident during the pilot program that the iPad device was more than a tool for teachers to use; it was also a powerful tool for student learning (District Content Facilitator, personal communication, April 7, 2011). Initiation of a pilot program within the study school district by the TLG focused on teacher use of the iPad device in a classroom setting. The TLG concentrated its efforts on providing school district staff members with training opportunities to maximize their use of the tool as an instructional device. Prensky's research pointed to a natural divide in the use of technology between digital natives, individuals who have spent their whole like surrounded by technology (2001), and digital immigrants; individuals who were not born into technology but have adopted it at some point (Prensky, 2001), resulting in a disconnection in the use of technology within the classroom (Prensky, 2008a). Prensky (2008a) advocated that technology be employed by teachers in the classroom, as an aid for students, as they learn to teach themselves with teacher guidance.

The researcher determined that a formal assessment of educators' perceptions of the usefulness and effectiveness of the iPad as an instructional device would allow technology facilitators, administrators, classroom teachers, and professional support staff to realize the value and practicality that the iPad device holds as an instructional tool within the school district.

Research Questions and Hypotheses

Hypotheses:

H_1: Classroom teachers who employ the iPad device as a classroom-learning tool will perceive positive effects on their classroom strategies and methods as measured by their ratings on a survey containing a Likert-type scale.

H_2: Administrators in schools with teachers who employ the iPad device as a classroom-learning tool will perceive positive effects on the classroom strategies and methods of teachers as measured by their ratings on a survey containing a Likert-type scale.

H_3: Professional support staff who employ the iPad device, as a learning tool will perceive positive effects on the strategies and methods they use to support classroom instruction as measured by their ratings on a survey containing a Likert-type scale.

Research Questions:

RQ1: How do classroom teachers in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?

RQ2: How do administrators in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ3: How do professional support staff in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ4: How do classroom teachers perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ5: How do administrators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ6: How do professional support staff perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

The researcher conducted a survey with teachers possessing district-issued iPad devices to determine their perceptions of the usefulness and effectiveness of this technology as a classroom instructional tool. Surveys sent to building administrators determined their perceptions of the effectiveness and usefulness of teacher iPad utilization within their buildings. Professional support staff were surveyed to determine their perceptions of the usefulness and effectiveness of the iPad device in improving the functions of their role and the device as a classroom instructional support. The researcher conducted an interview with the district technology facilitator to determine his perceptions of the effectiveness and usefulness of the iPad device to improve classroom instruction; and progress towards meeting district goals for implementation of iPad technology in the district's classrooms. Interviews conducted with the researched district's content facilitators were designed to gain their perceptions of the iPad device as a classroom-learning tool. The researcher utilized secondary data from the district's 2010-2011 iPad Pilot Exit Survey in the areas of teacher experiences with the iPad and their perceived usefulness of the iPad device as an instructional tool. The iPad Pilot Exit Survey was an online survey administered via Survey Monkey. The online survey invited Technology Leadership Group (TLG) participants to share their experiences

through a series of Likert, open ended and choice format questions. The researcher also considered district data collected through Moodle, an online learning environment, to review secondary forum data. "Moodle is an Open Source Course Management System (CMS)….It has become very popular among educators around the world as a tool for creating online dynamic web sites for their students" (Moodle, 2013, para 1). TLG participants were invited to the Moodle forum to ask questions, share information and experience with other TLG participants. This forum data was not used in the study for lack of relevance to answering the research questions.

The researcher believes the present study is worth pursuing in the study school district to determine the perceptions of personnel as to the effectiveness and usefulness of iPad technology as a classroom-teaching device.

Limitations-Delimitations of the Study

The researcher acknowledged the existence of limitations and delimitations of the study. The validity of the results in this study could be negatively affected by the various levels of technology experience represented in the sample composed of classroom teachers, administrators, and professional support staff within the researched school. The results could be affected by the experience of participants with the iPad device as the rollout for classroom teachers, administrators, and professional support staff occurred over a two-year period. Many teachers lacked training in using technology in a classroom setting and further professional development lacked uniformity in delivery across the three groups. The administration within each school of participating in this study may not have shared the same philosophy of technology in relationship to the curriculum. Teaching styles exhibited by the participants possibly affected the results of

this study and not all teachers utilizing iPads participated in this study. Not all participants were part of the TLG iPad pilot, and not all participants were part of the TLG iPad scout. The instrumentation, created by the researcher, was based on the researcher's own experiences. "Choosing an instrument that has already been developed takes far less time than it does to develop a new instrument to measure the same thing" (Fraenkel & Wallen, 2006, p. 115). The researcher administered the survey online. Surveys administered online tend to have a lower response rate (Nulty, 2008). The data collection period was limited from March 2013-July 2013. Participants began to receive iPad devices in the 2010-2011 school year with all staff receiving iPad devices by the 2012-2013 school year and this study was limited to one school district in a Midwest setting. The rate of technological change within the study school district was rapid. The primary investigator is a colleague to the majority of the potential participants in the study school district, with the potential for participants to be superiors to the primary investigator. The primary investigator is not a superior to any potential participants.

Definition of Terms

21st Century Skills- The National Research Council (2010) stated:

> these skills include being able to solve complex problems, to think critically about tasks, to effectively communicate with people from a variety of different cultures and using a variety of different techniques, to work in collaboration with others, to adapt to rapidly changing environments and conditions for performing tasks, to effectively manage one's work, and to acquire new skills and information on one's own. (p. 1)

Administrator- defined by the researcher as principals or assistant principals in elementary, middle, or high school buildings. For the purpose of this study, administrator was referred to as principal or assistant principal.

Classroom Teacher- defined by the researcher as grade specific teachers, such as elementary classroom teachers; special area teachers; content specific teachers; instructional specialists; teachers of gifted students; special school district teachers; and certified teachers in the regular routine of teaching students or a classroom of students. For the purpose of this study, classroom teacher was referred to as teacher.

Constructivism- "A view of learning suggesting that learners develop their own understanding of the topics they study instead of having it delivered to them by others" (Eggen & Kauchak, 2001, p.115). "The constructivist theory of learning states that each person constructs a unique reality to organize emerging knowledge of the world" (Brooks, 1984, p. 24). Brooks (1984) provided an example of the constructivist theory, as "A young child is likely to learn more about marine ecology by actually seeing than by reading a book about fish" (p. 24). "Constructivists believe that knowledge is the result of individual constructions of reality" (Brooks, 1990, p. 68).

Digital Immigrants- "Those who were not born into the digital world but have, at some later point in their lives, become fascinated by and adopted many or most aspects of the new technology" (Prensky, 2001, para. 6).

Digital Natives- "Represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers,

videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001, para. 3).

Emerging Technologies-

arise from new knowledge, or the innovative application of existing knowledge; lead to the rapid development of new capabilities; are projected to have significant systemic and long-lasting economic, social and political impacts; create new opportunities for and challenges to addressing global issues; and have the potential to disrupt or create entire industries. (Harper, 2010, para. 5)

iPad-

A revolutionary device for browsing the web, reading and sending email, enjoying photos, watching videos, listening to music, playing games, reading e-books and much more. iPad's responsive high-resolution Multi-Touch™ display lets users physically interact with applications and content. (Apple, 2010, para. 1)

Moodle- "Moodle is an Open Source Course Management System (CMS)….It has become very popular among educators around the world as a tool for creating online dynamic web sites for their students" (Moodle, 2013, para. 1).

Professional Support Staff- defined by the researcher as certified staff not in the regular routine of teaching children, but work with children. Professional support staff include Library Media Specialists, counselors, and additional certified staff that do not have a classroom of students. For the purpose of this study, professional support staff was referred to as instructional support personnel or instructional support staff.

Scout- defined by the study school district as sending TLG "out in advance" to gather information, explore possibilities and experience technology with their classes, as well as survey parents and students, to best inform decision-making, moving forward, adjust course if need be and plan to progress as smoothly as possible.

Summary

Educator perceptions of the iPad device and its usefulness in the classroom are a crucial component to implementing iPad devices and bridging the gap between digital natives and digital immigrants. This study sought to identify the perceptions of classroom teachers, administrators and professional support staff utilizing technology, specifically iPads, in education. Chapter Two contains a review of the current literature on technology and implementation within an education context. Chapter Three describes the methodology and procedures with data collection results noted in Chapter Four. Chapter Five includes a discussion of the results with implications, and ideas for future studies.

Chapter Two: The Literature Review

Technology is a bridge to close a gap between classroom instruction and creating relevant life skills (Spires, Wiebe, Young, Hollebrands, & Lee, 2012). "There is evidence that man is learning to use technology to his advantage rather than to his disadvantage. The scholar, who saves innumerable hours when a library computer researches his topic, has more time to think" (Scobey, 1972, p. 231) and with relevant technologies constantly changing; teachers and students need to attain skills in order to handle new technology (Scobey, 1972; Lesgold, 1986; Prensky, 2008b). Dible (1970) stated, "For teachers, change is not new. Teaching is, by its nature, an evolving profession dedicated to guiding the learning of successive generations of students growing up in a changing environment" (p. 123). Schools continue to make investments in technology (Li, 2007; Carroll, 2000) and many schools are moving to one-to-one mobile learning environments (Bouterse, Corn, & Halstead, 2009; Spires et al., 2012).

Significant and rapid technology developments have occurred in a short period, ushering a change in education. This change requires a new set of skills for teachers and students. "The students of tomorrow should be expected to understand each of the technologies conceptually, appreciate their interrelations, know their applications, and, eventually, be able to use each effectively" (Quinn, Kirkman, & Schultz, 1983, p. 38). A review of literature regarding the history of technology, technology in education, our changing students, 21st century skills, application of technology in education, and technology implementation provide a framework for the evolving usage of mobile devices, specifically the iPad, in education.

History of Technology

Over the last 50 years in the United States, digital technology has drastically changed everyday life with devices and concepts to simplify tasks or make life easier. "Drums, torches, signal fires, flags, pictographs on papyrus, and writing on clay and stone tablets were among the earliest technologies humankind used in its efforts to reduce the impact of distance, time, and location on communications" (Papp, Alberts, & Tuyahov, 1997, p. 13). Technology has evolved into much more than devices or machines (Davis, 1968; Komoski, 1968; Peck & Dorricott, 1994). Davis (1968) stated, "A technology is not a machine; it is a social system in which machines and technological processes are related to people and their actions and other features of a society" (p. 67). Komoski (1968) stated, "To the Greeks, 'technology' was used to describe the process whereby an accomplishment of human artistry (whether action or artifact) was systematically organized so that others might use it to achieve the same ends more efficiently" (p. 735). While Moersch (1995) believed, "Our fascination with technology stems, in large degree, from its ambiguity within existing paradigms. [Today's] technology represents things, like computers, modems, pencils, microscopes, and televisions; words or ideas, like 'progress' and 'change (p. 40).

1970's –The Information Age. The Information Age began in the early 1970's characterized by new technological advancements.

> The combination of new developments in electronics, computer technology, information storage, communications, and display techniques thoroughly permeated all aspects of society. Progress in handling information also became a

> driving factor in the enormous expansion of technology and science (Bunch & Hellemans, 2004, p. 625)

The technological advances of the Information Age have transformed personal and professional lives (Dmytrenko, 1992). The early 1970's provided two inventions that both older and young adults used on a daily basis: email and the cellphone. In 1971 Ray Tomlinson invented email though it would be many years later, in 1988, when e-mail surfaced commercially (The Big Idea, 2011). Prior to its first commercial use, universities and research groups used early e-mail messages (The Big Idea, 2011). "Since the middle of the 1990s, the widespread use of e-mail has had a truly radical impact on our daily lives" (Burrows, 2007, p. 42).

Computer. With a common denominator in the fields of electronics communications and information storage, Bunch and Hellemans (1993) found that the Information Age and personal computers were now connected. In the 1960's and 1970's a market for smaller and lower priced computers grew resulting in the minicomputer quickly followed the microcomputer also known as a personal computer (Carr, 2008). The Altair 8800 microcomputer, labeled a kit computer, debuted in 1975. *Popular Electronics* presented the microcomputer as "a full-blown computer that [could] hold its own against sophisticated minicomputers now on the market. And it doesn't cost several thousand dollars. In fact, it's in a color TV-receiver's price class—under $400 for a complete kit" (Roberts & Yates, 1975, p. 33). The debut of the Altair 8800 personal computer was a major event in 1975 and this device changed the world (Bunch & Hellemans, 1993). Steve Jobs and Steve Wozniak, founders of Apple, announced the Apple II personal computer in 1977 (Brown, 2002; Bunch & Hellemans, 1993) as the

first fully assembled personal computer (Bunch & Hellemans, 1993). Along with the computer brought the promise of "the paperless office" for the business environment (Dmytrenko, 1992). The personal computer "changed how people communicate[d], and irrevocably altered their work and personal lives" (The Big Idea, 2011, p. 23).

IBM introduced a personal computer (PC) in 1981 (Bunch & Hellemans, 1993; Friedman, 2005), as did Osborne, followed by a "clone" of the IBM PC by Compaq in 1982 (Bunch & Hellemans, 1993, p. 430). *Time* Magazine bestowed the personal computer the honor of "Machine of the Year" in 1983 (*Time*, 1983), the same year the term "computer virus," was coined by Fred Cohen who gave birth to computer security (Bunch & Hellemans, 2004). IBM and Apple continued to improve and introduce various personal computer versions. IBM released a personal computer with a built-in hard disk drive in 1983, while the Macintosh, a product of Apple released in 1984 utilized "icons, a mouse, and an intuitive user interface" (Bunch & Hellemans, 1993, p. 434).

> Each year new versions appear, faster and with more capabilities than those of the year before. The new personal computers are smaller and lighter each year, and more and more workers find that the laptop or notebook computer that they carry with them from place to place is most useful for their purposes. Such small computers have become so advanced in design that many people prefer to use them instead of similarly equipped desktop computers even when working in the same place each day. (Bunch & Hellemans, 2004, p. 632)

In 1985 Toshiba created the first laptop computer, T1100 (Bunch & Hellemans, 2004). Consumer Reports (2005) buying guide cited laptops outselling desktops for the

first time with features such as a larger display, more usable keyboards, faster processors as well as CD and DVD drives, and larger hard drives. "And a growing interest in wireless computing play[ed] to the laptop's main strength: its portability. A laptop is the only way to take full advantage of the growing availability of high-speed wireless Internet access" (Consumer Reports, 2005, pp. 131-132). "Desktop PCs are more ergonomic than laptops, further exemplifying the tradeoff between portability and ergonomics. Similarly there's a tradeoff economically" (Goldsborough, 2013, p. 12).

Collins and Halverson (2009) stated, "Computer tools greatly extend the power of the ordinary mind in the same way that the power tools of the Industrial Revolution extended the power of the ordinary body" (p. 11). Turkle (1984) stated, "The computer is a particularly rich and varied tool for serving so wide a range of purposes" (p. 165). Alberts, Papp, and Kemp (1997) noted, "computers have terrified many people because of the complexity of their 'man-machine interface.' Recently, however, the widespread availability of easily understandable and usable operating systems and software such as Macintosh and Windows has reduced the level of fear" (p. 45). Turkle (1984) believed, "The computer is evocative not only because of its holding power, but because holding power creates the condition for other things to happen" (p. 14).

Mobile, portable, and wireless technologies. In 1971 the first pocket calculator, termed the Pocketronic, was developed by Texas Instruments, and weighed 2.5 pounds (Levy, 2002). In 1979, Sony founder Masura Ibuka created the personal stereo, which was termed as the Walkman; this model was improved and titled the Walkman II in 1981 (Levy, 2002) followed by Apple's iPod, an MP3 player that debuted in October 2001 (Apple, 2001). Subsequent generations of the iPod were created with the most recent

versions being the iPod touch and iPod Nano. In addition to 40 hours of music playback, a few iPod touch capabilities included a 5 megapixel camera with panorama feature, AirPlay® mirroring, and Siri the intelligent assistant (Apple, 2012a). Apple (2012a) quoted Senior Vice President of Worldwide Marketing, Philip Schiller, "With over 350 million sold, iPod is the world's most popular and beloved music player" (para. 2).

Martin Cooper invented the cellphone in 1973 while in the role of director of research and development at Motorola (The Big Idea, 2011). Operation of commercial cellular systems began in 1983 throughout the United States "by 1991, approximately 7.5 million Americans subscribed to cellular service; and by 1995, the number had grown to 25 million, with cellular coverage available in half the country" (Alberts et al., 1997, p. 40). Apple released the iPhone in June 2007 and featured a multi-touch display and combined "three products into one small and lightweight handheld device—a revolutionary mobile phone, a widescreen iPod®, and the Internet in your pocket with best-ever applications on a mobile phone for email, web browsing and maps" (Apple, 2007, para. 3). "Mobile phones, too, [were] turning into powerful handheld computers—Apple's multipurpose iPhone [was] a much-discussed example" (Carr, 2008, p. 123).

Internet. Planning for what would become the Internet began in 1967 at the Advanced Research Projects Agency (ARPA). The goal of the project was to connect computers; many individuals also viewed this as connecting people (Carr, 2008). Tim Berners-Lee would invent the World Wide Web in the early 1990s, which organized information (Brown, 2002; Burrows, 2007; Carr, 2008; Friedman, 2005; Funk, 2009). Berners-Lee created the first website in 1991 for scientists to share research (Burrows, 2007; Friedman, 2005). "Although the terms World Wide Web and Internet are often

used interchangeably, they are not the same thing. It is possible to have the Internet without the Web, but the Web cannot exist without the Internet" (The Big Idea, 2011, p. 19). "By 1991, approximately 4,000 networks were attached. By 1995, approximately 40,000 networks were connected, two-thirds in the United States. Globally, a new network joined the Internet in 1995 approximately every half hour" (Alberts et al., 1997, p. 43).

Web 2.0 tools. Web 2.0 refers to how the Web is being used, not an updated version (Burrows, 2007). "Web 2.0 can describe particular websites, cultural trends like social networking, blogging or podcasting, or the underlying technology and rich, streaming media that makes today's coolest web applications possible" (Funk, 2009, p. xi). Development of the Web 2.0 concept was attributed to Tim O'Reilly with the term coined by O'Reilly and his colleagues in 2003 (Burrows, 2007). O'Reilly and his colleagues compared the old Web with the 2.0 Web, and created themes. "The three most important were the Web as a platform, the harnessing of collective knowledge, and the creation of a 'rich' user experience" (Burrows, 2007, p. 17). Harnessing of collective knowledge encompassed social media. Burrows (2007) noted, "mash-ups," which utilize various Web 2.0 technologies as, "One genuinely innovative area that seems to have evolved out of the Web 2.0 debate and how data can be combined from different sources—even those over which the user has no control" (Burrows, 2007, p. 19). Burrows (2007) gave an example using a gallery of photos with user comments from Flickr and combining both components with Google Maps.

iPad-tablet computers. The first generation iPad device, a tablet computer by Apple, was released in April 2010. Since the release of the original iPad device, Apple

has introduced the iPad 2, iPad 3, iPad 4 and iPad Mini (Apple, 2012b). "Tablet computers, of course, are nothing new. Tech companies have tried the concept since the 1990s. But those flat slabs never caught on for a variety of reasons" (Biersdorfer, 2010, p. xv). Waters (2010) noted Apple claimed sales of "300,000 iPads by midnight on that first day, and that more than a million apps and 250,000 e-books were downloaded to those devices. Apple says it delivered more than 500,000 iPads before the end of the first week" (para. 1). According to the Pew Research center, "A third (34%) of American adults ages 18 and older own a tablet computer like an iPad, Samsung Galaxy Tab, Google Nexus, or Kindle Fire—almost twice as many as the 18% who owned a tablet a year ago" (Zickuhr, 2013, p. 2). The size, weight, and lower cost, compared to laptops, were cited as advantages of the tablet and noted the iPad as one of the top-rated tablets (Goldsborough, 2013). "Tablets are projected to surpass laptops in U.S. sales for 2013—240 million tablets versus 207 million laptops—according to market research firm NPD Display Search" (Goldsborough, 2013, p. 12).

History of Technology in Education

Huebner (1974) stated, "If we remember that technology is a tool—an instrument—then it is impossible for us to think of any time period in educational history when our educational hopes were not tied closely to an emerging technology" (pp. 394-395). Peck and Dorricott (1994) noted technology, as a tool, is only part of the meaning of technology. "The definition includes two components: a *product*—the tool that embodies the technology—and a *process*—the information base of the technology. Both technological products and their systematic processes have a great deal to offer schools" (para. 4). "By recognizing that technology is something that has been thought of and

used in various ways in the past, educators can conceive and invent—they can control—new uses of technology in the future" (Huebner, 1974, p. 393). Dible (1970) described past media such as textbooks, chalkboards and even teachers, evolving over time to become better products in schools "however, their functions for learners have not changed fundamentally over a period of years" (p. 123). Dible further acknowledged that multi-media could be defined in many ways and "interpreted as the variety of materials, processes, and strategies developed, available, and increasingly used today. Some of these uses are to learn, to persuade, to compute, and to store and retrieve information" (p. 124).

Early teaching devices. Throughout the 20th century, there have been many technology tools to change education. Mehlinger (1997) noted these tools as radio, film, overhead projector, television and teaching machines. Wigren (1960) believed the technological device educators decide to use in their classrooms should be determined by the purpose it needed to serve and find new uses for devices based on needs instead of using the device for its original intention. Davis (1968) noted the usage of overhead projectors, and screens, with the teacher sitting to teach in lieu of chalkboards when the teacher would stand to teach. Davis (1968) referred to overhead projectors and television in classrooms as "a few primitive technologies that have 'happened'" (p. 67).

The teaching machine. The teaching machine was developed by S.L. Pressey in 1924 when Pressey noticed the lack of devices to decrease labor for the classroom since such devices were employed in homes and offices, and could reduce the time it took teachers to grade (Lumsdaine, 1961). The purpose of the teaching machine was to provide individual instruction to students. "It operates on the tutorial system—the best

and simplest way to teach. The tutorial system has three basic parts: the student, the program of instruction and the tutor. In this instance, the machine simply substitutes for the tutor" by providing feedback in response to the students selection (Stolurow, 1962, p. 66). The first teaching machine was the size of a portable typewriter (Lumsdaine, 1961) and presented a multiple-choice question, of which the student selected a response, and depending on how the student responded, the machine would present the next question or allow the student to try again (Lumsdaine, 1961; Stolurow, 1962). Pressey's first teaching machine provided an extrinsic reward in the form of a piece of candy via an attachment on the side of the device after a certain number of correct responses (Lumsdaine, 1961). The design of the teaching machine allowed students to work individually and provided the student with immediate feedback (Lumsdaine, 1961; Stolurow, 1962). "The concept of self- instruction, as incorporated in the teaching machine, is first of all, a concept of *individual* instruction. This concept [was] certainly not a new one" (Lumsdaine, 1961, p. 271).

Educational television. The invention and use of the teaching machine in education to individualize instruction, contrasted with the purpose of the television (Komoski, 1968). The invention of the television was originally not an educational device (Gold, 1963). Witt (1963) perceived educational television for instruction as "spectacular and significant" (p. 424), while Miner (1963), noted many challenges and problems with educational television. "Instruction of high quality by the best qualified television teacher does not alone insure optimum learning; the classroom teacher does, in the final analysis, determine the success or failure of educational television in the classroom" (p. 444). Miner further stated, "The television teacher's greatest challenge is

to construct each lesson so that throughout the entire production a maximum learning opportunity is provided for the pupil" (p. 447). Komoski (1968) saw the use of television in school as a disappointment for children who might have used the device as an escape from real life within their home. The view of television at home, contradicted television at school, which provided students with "a teacher (usually severely restricted in movement) who communicates, not through the almost mesmerizing, multi-faceted, audio-visual medium the child has come to know at home, but (in most cases) through the all-too-familiar medium of the 'talking face" (Komoski, 1968, p. 737).

In 1961, the average child spent "one-sixth of his waking hours watching television and by the age of 16 had spent more time in front of a television set than he ha[d] in the classrooms of his schools" (McCullough, 1961, p. 447). Kauchak (1978) reported by the end of high school the number of hours spent watching television exceeded the number of hours spent in a classroom. In 1970, Nylin reported on educational television (ETV) noting "Informal observation suggest[s] that many teachers and school systems [had] completely or almost completely 'dropped out' of the ETV scene" (p. 137). One reason for the discontinued use of television was the lack of equipment. "Unless a school has multiple channels and video-tape equipment (and personnel to operate it) available, the teacher is locked into a schedule not of his own choosing and beyond his control" (Nylin, 1970, p. 137). Miner (1963) stated students learning via educational television must be active participants in the lesson, as the material cannot be repeated. "This call[ed] for a transition from the use of an instrument which is normally utilized for passive recreation to its use for purposes of doing, interacting, remembering, and thinking through consecutive learning sequences" (Miner,

1963, p. 448). "The fact is profound that children learn much from viewing television. They bring to school ideas, questions, suggestions, concepts, attitudes and skills for which television may be given credit" (Davis, 1961, p. 285). Wigren (1960) viewed future schools of 1985 as "using television, teaching machines, video tape recorders, instantaneous photography, individual viewing and listening equipment as resources for learning which [would] free both teacher and learner for unlimited learning horizons" (p. 498). Wigren's 1960 prediction for the future of our schools missed the role the computer would play.

Revolution in education. The prediction of a technological breakthrough in education emerged by 1985 and encouraged by technological advances. "Education will feel the impact of technological developments with nothing short of explosive force" (Wigren, 1960, p. 495). Valdez (1986) acknowledged the prevalent ideas regarding the positive impact of technology in education while Dede (1989) predicted technological change between 1989-2009 would affect both life inside and outside of school. "Evolving information technologies will transform the nature of work, and this transformation will in turn affect the design and content of the school curriculum. As jobs change, schools must shift in response" (Dede, 1989, p. 23).

Ehrmann (2000) indicated "every five or ten years, when a major new computer chip, visual medium, or telecommunications channel comes along, the trumpet is sounded: The revolution is about to happen. But the revolution doesn't happen" (para. 3) and attributed the failure to Moore's Law. Moore's Law, created by Gordon Moore, indicated, "the power of microprocessors doubles every year or two" (Carr, 2008 p. 58). Ehrmann noted "Moore's Law [had] created waves of improvement in the processes on

which education most relies: how people can and get and use information and how they can communicate with one another" (para. 7).

The Information Age in education. The tools of the information age changed education (Egendorf, 2004). "Schools can and should be restructured in order to effectively educate young people to live successfully in the information age" (Marzano & Arredondo, 1986, p. 25). Cheves and Parks (1983) believed it essential for students to "use the tools of the information age…. It is these same students who have developed attitudes that encourage the search for the best possible solution to problems" (p. 57). "Newer uses of technology that mirror problem solving and enhance thinking skills are giving students the skills they need for optimal employability in an information age" (Valdez, 1986, p. 5). "Tools we now treat as technical marvels will seem primitive in 5 years" (Mehlinger, 1997, p. 139). Mehlinger (1997) also acknowledged the future rapid growth of technology and technology tools and indicated "technology will become faster, cheaper, more powerful, and easier to use. We can also predict that new devices that we can scarcely imagine today will be on the market before the end of this decade" (p. 139). The impact of the Information Age on education and specifically the computer, would be viewed as a creative teaching tool (Dmytrenko, 1992).

Students and teachers need to work together to create learning (Apple, 2008; Carroll, 2000; Caverly, Peterson, & Mandeville, 1997; Richardson, 2012; Spires et al., 2012). Collaborative learning between teacher and student is essential in the information age (Carroll, 2000). Sprague and Dede (1999) stated that the integration of "student experiences with technology into the curriculum, changes the role of the teacher. The teacher no longer has to be in charge every minute, but can give some of the control over

to the students and the technology" (p. 7). Sprague and Dede further noted this as a concern for teachers who might be viewed as not doing their job correctly, but indicated "constructivist teachers work as hard or harder than teachers who rely on presentational methods" (p. 7). Wiggins and McTighe (1998) stressed the importance of students making meaning of learning and in order for this to occur, teachers should change their teaching style and practice a constructivist approach. Menard (2010) researched constructivist classroom practices impacted by teacher perceptions of technology, and noted the creation of learning communities when, "teachers expanded their capacity to accept expert student support as a valuable classroom asset. Through the numerous connections provided by technology, the teachers developed new resources and insights that were subsequently integrated into the curriculum" (p. 119).

Carroll (2000) described "invention and knowledge generation" (para. 17), one dimension of a "Networked Learning Community" (para. 14), as older and younger generations sharing knowledge to create new knowledge. Carroll noted schools lacking in this type of collaboration and believed this skill essential for students. "But our information age economy demands this intergenerational, collaborative construction of knowledge, and our schools will fail to develop young people who can be productive citizens in this economy if they do not support this mode of learning" (Carroll, 2000, para 17). Richardson (2013) supported teachers and students as co-learners with teachers "expert at asking great, open-ended questions and modeling the learning process required to answer those questions. Teachers should be master learners in the classroom" (p. 13). "Educators must become more than information experts; they must also be collaborators in learning—leveraging the power of students, seeking new knowledge alongside

students, and modeling positive habits of mind and new ways of thinking and learning" (Apple, 2008, p. 8).

McCain (2005) believed that students not knowing something, was a component of learning and the verbal acknowledgement of not knowing was okay. "We talk about the fact that significant discoveries in human history have been made because intelligent people, realiz[ed] they didn't know something, [yet] had the courage to set out to learn what they didn't know" (McCain, 2005, p. 72). Access to technology of the Information Age allowed student knowledge to grow. McCain explained that students must act on not knowing and build the skills to increase the knowledge lacked. McCain referenced students as school-aged children but the idea was beneficial for students of all ages including teachers. "As educators, we often talk with our students about the importance of being lifelong learners, and we should model this for them" (McCain, 2005, p. 82).

Computers in education. Not since the invention of the printing press and movable type has there been a technology with as much promise and implications for education as the computer (Bork, 1986; Flynn, 1968; Kulik, 1983; Lesgold, 1986). A significant educational advantage of the computer is an interactive learning experience (Bork, 1986). "American education has now entered the technological revolution. In the forefront of this revolution stands the electronic computer with all of its potential and mystique" (Flynn, 1968, p. 24). Sirotnik (1985) cited integration of technology as a major issue. "To prevent computers from meeting the same fate as educational TV, teaching machines, and the like, evaluators need to ask: How has the learning environment been modified to receive and constructively exploit the full potential of computer courseware" (p. 39). Martin (1986) stated, "We need to analyze the reasons for

this seeming imperviousness and determine how schools can take full advantage of the extraordinary power of this technology, which in many ways incorporates all of the others" (p. 32).

Mobile, portable, and wireless technology in education. Schools across the country adopted one-to-one technology initiatives (Asher-Shapiro & Hermeling, 2013; Bouterse et al., 2009; Murray & Olcese, 2011; Spires et al., 2012). Bouterse et al. (2009) stated, "from one-to-one learning initiatives to laptop carts, schools all over the country are using portable computing models to achieve flexible technology access" (p. 14). Mobile technologies allowed learning to occur anywhere (Asher-Shapiro & Hermeling, 2013; Greenhill, American Association of Colleges for Teacher Education, & Partnership for 21st Century Skills, 2010; Koszalka & Ntloedibe-Kuswani, 2010). "The size, ease of use, portability, prevalence, and advanced features of mobile technologies (e.g., voice, display, Internet access, interactivity) have sparked interest in integrating these technologies into instructional environments" (Koszalka & Ntloedibe-Kuswani, 2010, p. 139). Koszalka and Ntloedibe-Kuswani (2010) referred to mobile learning as "m-learning" and indicated m-learning involved a mobile learner. "Instructional activities are not within a set place. Rather learners are engaged, often synchronously with others and learning resources, while outside the borders of a formal classroom" (p. 142). PDA (personal digital assistant), mobile phones and MP3 players were perceived as m-learning devices, while laptops and notebook computers were excluded from the list of mobile devices as "they [were] not devices that people [could] carry and quickly access at any time due to their size, configuration, and the time required to boot up and shut down" (Caudill, 2007, p. 2). Wangemann, Lewis, and Squires (2003) referenced the Palm

Education Pioneers Program: Final Evaluation Reform from the 2002 study of handheld computers and indicated "of the teachers who participated in this study, about 90% felt handhelds were effective classroom tools and had the potential for making a positive impact on student learning" (p. 26).

Obringer and Coffey (2007) cited cell phone statistics from NetDay's survey results in 2004 reporting "58 percent of 6th-12th graders [had] a cell phone and 68 percent of students regularly [brought] cell phones to school" (p. 41). Obringer and Coffey further noted the increase in cell phones in the United Stated from 1987 to 2002 being 1.2 million to 145 million respectively. Johnson (2012) acknowledged the rise of schools allowing students to bring personally owned devices to school. Prior to this, it was usual for district policy within school districts to ban the use of technology devices. "The capabilities of cell phones have been evolving quite quickly…If cell phones mimic other technologies, these features will only increase. Schools will be pressed to stay ahead of this fast-moving technology" (Obringer & Coffey, 2007, p. 45). Johnson (2012) believed successful implementation of students bringing their own devices relied on established policies; rationale for plan; infrastructure requirements; staff training; informed parents; resources wisely selected; and equity.

The Internet and Web 2.0 in education. McCain (2005) stated effective technology usage in the classroom stemmed from the teacher's ability to create simulation tasks and role-playing scenarios. "Creating specifications for a task that require students to use a word processor, a spreadsheet, the Internet, a digital camera, and so on is the key to getting students to use technological tools" (p. 36). Dible (1970) believed "the environment both within and outside the school [had] always been multi-

mediated….the significant increase in knowledge about the impact of media on the educative process, [brought a] growing recognition that education in the traditional sense [was] no longer enough" (p. 123). Geck (2006) noted the youth only know the reality of their Internet-based world "they are likely to have heightened technical expectation, attitudes, and beliefs. For example, they expect libraries and research resources to be accessible remotely (from home), where they can multitask comfortable and snack and watch television" (para. 6).

The Web provided continual access to interactive learning experiences for students (Carroll, 2000; Spires et al., 2012). Cookson (2009) stated, "Teachers and students already use the Web to create lessons, communicate, and share with others across the globe. Schools have Web-based curriculums, and many people already use Web 2.0 technology to reach thousands, if not millions, of learners" (para. 30). Spires et al. (2012) noted, "In addition to constant and immediate access to information, with the new wave of Web 2.0 tools, students have the authoring capacity to create, mash up, comment on, and edit content, as well as communicate with people globally" (p. 236).

The nature of life today is personalized and customized (Collins & Halverson, 2009; Richardson, 2012). "We personalize our playlists through Rhapsody and iTunes, our reading through Amazon and Twitter, our search results on Google and Bing. But in the midst of this culture of customization, what about education?" (Richardson, 2012, para. 3-4). Spires et al. (2012) believed modern teachers customized learning for student needs, with students and teachers, sharing the learning experience and Richardson (2012) indicated Web 2.0 tools as the core of personalization. "By embedding such social web

tools as blogs and social bookmarks into the learning culture, both students and teachers can stay organized and focused" (Richardson, 2012, para. 19).

In later publications, Richardson (2013) noted the web placed learning in a real-world context, with information quickly available and the ability to connect, talk, and create with individuals in different locations. "That's when technological change becomes ecological, when the classroom walls are obliterated, when students truly drive their own learning, and when people whom we will never meet in person become some of our best teachers" (p. 12). A virtual world provides students and teachers with a new classroom. According to Zhao (2010) "one of the initial challenges educators face in preparing students for 21st century lives is understanding what knowledge and skills are needed to live successfully in the virtual world" (p. 15). Children need to be prepared and taught how to live in a virtual world. "Children must understand the global nature of the virtual world that it is constantly evolving and expanding….Physical distance does not matter here" (Zhao, 2010, p. 16). Zhao (2010) also believed, "educators should use technology to create more authentic learning experiences for children….If they are interested in exploring other cultures we can send them on virtual field trips" (p. 17). Spires et al. (2012) believed one-to-one initiatives had the potential to create authentic learning experiences, "enabling students to create both semantic and personal significance with academic concepts in the context of the world around them" (p. 237).

Educational technology vs. technology education. Teaching technology and educational technology differ. Educational technology is the usage of technology to support learning, goals, or objectives (Jones & Paolucci, 1999; Meierhenry, 1974; Valdez, 1986). Jones and Paloucci (1999) did not want educational technology to be

confused with technology education that "involves teaching the use of technology" (para. 8). Noble (1984) believed "computer literacy [was] unnecessary for consumer, student, worker, or citizen in the information age" (p. 607). Noble equated computer literacy with driving a car and noted driving skills are "best acquired as the need for it arises; similarly, people can learn whatever they need or want to know about computers without having to be prepared or 'literate' beforehand" (p. 603). Lesgold (1986) differed from Noble (1984) and believed students must be taught "computer literacy" which is less about the utilization of a computer device and more "a set of broad cognitive capabilities that allow one to think deeply, creatively, and efficiently and to communicate the results of that thinking" (p. 8). To a degree, Sprague and Dede (1999) agreed with Noble (1984) on when students should learn to use technological tools. Technology skills should be taught alongside content (Sprague & Dede, 1999) and students given, "only as much instruction as they need to complete their project…. It is not necessary to teach students everything about a particular tool or concept before they start to us[e] it" (p. 8). Moore (2003) supported the use of technology to strengthen content knowledge.

iPads in education. Collaboration and creativity are a few advantages of the iPad for mobile learning in education. Prensky (2010) believed "The iPad combines all of the great features of the iPhone and iTouch in a size which is likely to be much more appealing to K-12 teachers –and possibly to students as well" (para. 2). Eisele-Dyrli (2011) noted the continual development of mobile devices, specifically the iPad, for educational use and Waters (2010) cited the iPad as a potential educational tool but also noted it does not replace other devices but rather is another tool to be utilized and chosen based on the task. Waters presented content creation, as an example of one task to be

completed “on higher-end desktops and laptops; collaboration and research are performed on midrange desktops and laptops; browsing and editing are jobs for netbooks; and consuming media and providing ‘simple responses’ call for interactive whiteboards and tablets” (para. 17). Dappolone (2013) noted technology as useless if the purpose was to replace traditional materials. “Instead of merely using technology for the sake of using it, we should see technology as an opportunity to make our best practices even better” (p. 69). Johnson (2013) predicted tablet usage, like the iPad device, to continue to grow in schools and originally perceived the iPad device as a “media consumption tool” (para. 4). Johnson (2013) categorized tablet devices and smart phones as the “four Cs”: (para. 5) consumption; competition; communication; and creation; with a bonus “C” of convenience.

The iPad device enabled mobile learning, and became a popular choice in schools moving to one-to-one learning environments (Asher-Shapiro & Hermeling, 2013). An Apple ID provides students “access to course work, homework, and a multitude of educational apps available through the iTunes store. Teachers load the bulk of course materials on the devices to allow students to do schoolwork remotely” (Asher-Shapiro & Hermeling, 2013, p. 70) and mobile technologies allow students to be creators of knowledge (Eisele-Dyrli, 2011). Murray and Olcese (2011) sought to discover iPad apps that fostered the 21st century skill of collaboration and noted a lack of apps to address this skill. Further noting “the number of applications developed to run on the iPad are principally targeted at the consumption of content within various media and not necessarily the creation or collaboration of that content” (Murray & Olcese, 2011, p. 48)

which may be due to components of the device that contains collaborative capabilities built in, which support 21st century skills (Murray & Olcese, 2011).

The iPad encouraged creativity with the built in camera and creative apps (Foote, 2012; Shareski, 2011). "The addition of a camera, creation software such as iMovie and GarageBand, and keyboard enhancements allow[ed] it to offer some of the best creative applications for education" (Shareski, 2011, p. 58), the iPad is all about customization (Shareski, 2011). In a one-to-one iPad initiative, Foote (2012) found increased productivity among the 11th and 12th grade students with iPads and noted the iPad as more of a collaborative tool compared to the laptop (Foote, 2012).

Relevance of Technology in Education

Technology is ubiquitous in education (Apple, 2008; Eisele-Dyrli, 2011; Spires et al., 2012; Swan, van 't Hooft, Kratcoski, & Unger, 2005). Ohme (1973) acknowledged the continual application of the idea of relevance in education yet viewed the terms relevance and innovation as non-associated. "It would appear that the two are mutually nonrelated, even though the very nature of relevance should, by definition, be practically synonymous with innovation" (Ohme, 1973, p. 523) and noted the need for teachers to associate the two terms "to the extent that the two concepts are literally inseparable" (p. 523). Learning in the 21st century needs to be authentic and relevant (Apple, 2008; Zhao, 2010). Greenhill et al. (2010), noted learning and innovation skills as "most often cited when referring to 21st century skills. They are increasingly being recognized as attributes that separate students who are prepared for a more and more complex life and work environment in the 21st century, from those who are not" (p. 9). Moore (2003)

believed, “If academic institutions are to have relevance they must reflect on the effect information technology has had on society and the way students learn” (p. 26).

Learning can occur wherever and whenever opportunities exist (Carroll, 2000; Cavanaugh, 2003; Collins & Halverson, 2009; Cookson, 2009) particularly with mobile technologies (Asher-Shapiro & Hermeling, 2013; Cavanaugh, 2003; Eisele-Dyrli, 2011; Koszalka & Ntloedibe-Kuswani, 2010; Spires et al., 2012; Swan et al., 2005). Cookson (2009) suggested, “If we stop thinking of schools as buildings and start thinking of learning as occurring in many different places, we will free ourselves from the conventional education model that still dominates our thinking” (para. 36). Cookson (2009) noted Socrates taught his students in an unconventional classroom, one that was wherever learning occurred. Collins and Halverson (2009) believed that as learning locations shifted from schools, individuals would alter their view of learning, leading to new experiences bridging classroom and new learning environments. “Education may follow the path of home schooling by emphasizing field trips, interacting with peers, playing computer games, or even teaching others with technological tools” (Collins & Halverson, 2009, p. 129).

Teachers—Yesterday, Today, and Tomorrow

Teachers and technology. Teacher technology usage provided teachers the ability to increase their creativity as mundane or routine tasks were completed by the use of technology (Carnine, 1984; Gold, 1963; Lumsdaine, 1961; Miller & Goldberg, 1963). Teachers began creatively utilizing software and computers to their advantage (Lesgold, 1986; Valdez, 1986) yet in the end, schools were disappointed because “miracles were expected” (Miller & Goldberg, 1963, p. 431). Stolurow (1968) stated, “The educational

innovator is interested in technology because he sees that it might improve the quality of education and more particularly instruction, to make better use of teachers' and students' time and energy" (p. 765).

Rogers (1972) identified a "technology style" of teaching where teachers were willing to experiment and share control as the most innovative. "Such an experimenter is secure enough to say he does not have all the answers while encouraging his students to become involved in seeking answers to questions they themselves have posed" (p. 304). Means and Olson (1994) acknowledged the demands of technology on teachers and noted the teachers who have accepted the challenge have had powerful change occur. "Technology plays an important role, but it is a supporting role. The students are the stars. The playwright and director—and the power behind the scene—is, as always, the teacher" (Means & Olson, 1994, para. 30). Gullen and Zimmerman (2013) found that, "Teachers infuse technology into the classroom most successfully when they find new ways to enhance current practices, leveraging technology's ability to help them connect, collaborate, and enrich" (p. 66). Means (2010) believed, "Although many teachers certainly are using today's technologies in innovative ways, they remain the exception rather than the rule" (p. 285).

Technology dehumanizing education. The idea of technology or machines replacing teachers and dehumanizing education is a common fear (Grady & Baricevic, 1974; Li, 2007; Oakes & Schneider, 1984; Wagner, 1966). "There is an uneasy feeling among some educators that technology is dehumanizing education. There is concern that the student is becoming a programmed robot….The obvious fact is that educational technology is here to stay" (Wagner, 1966, p. 491). Torkelson (1972) noted teachers

would not be replaced with machines and individualized education was not dehumanizing. Like Torkelson (1972), Hayes (1968) contradicted the idea of technology dehumanizing education, but rather believed it humanized instruction. "[T]echnology can be used to treat problems faced by learners as perceived by learners. If it is the *learner's* humanness that we seek to treat…technology has it all over traditional teaching in humanizing the learning process" (Hayes, 1968, pp. 726-727).

Colton (1974) believed appropriate role assignment avoided the stigma of technology dehumanizing education and suggested that if teachers "could ever get over the notion that they must be performers and realize that they could better help their students by managing the variables of instruction, then we would be moving toward a truly humanized dimension of technology" (p. 417). Stolurow (1968) believed technology made a "more humane use of human beings" (p. 765). Huebner (1974) stated:

> If, then, we set aside our naïve beliefs that technologies will destroy man's humanity, or that educational technologies will dehumanize the schools; and if we set aside our beliefs that new educational technologies are our only home for the future, what do we have left to direct our movement into our education futures? We have, first of all, the awareness that we have never in our educational memory been without educational technologies. (p. 395)

Oakes and Schneider (1984) stated computers cannot respond with sensitivity and cannot replace how human teachers respond to students. "Computers will never communicate the joy of discovery and the pleasure in helping someone learn. Teachers will always be

required for those subtle and complex interactions that are the heart of the teaching/learning process" (p. 73).

Many teachers disagreed that technological devices would replace their role in the classroom; teachers perceived the devices as an extension of their role (Dible, 1970). However, Li (2007) discovered both teachers and students still "share the belief that technology may replace teachers. Regardless of its origin, this shared view may seriously hurt our education system since it contributes to the teachers' resistance to use computer technology in schools" (p. 393).

Technology as an extension of the teacher. Colton (1974) believed people were the foundation of education by stating "it is still the human who makes the plans, makes the decisions, and, by doing this systematically, frees himself for the appropriate times when learners need that very special kind of personal attention" (p. 417). Flynn (1968) noted, "We should not expect everyone in education to become a computer expert. Each person's own specialty should remain his chief concern" (p. 25) while Dilworth et al. (2012) noted the importance of content knowledge. "The most effective uses of technology also require a deep understanding of content and related pedagogical strategies. Teacher educators comprising these content associations are, therefore, best positioned to understand how technology may be best employed with their specific disciplines" (p.12).

Scobey (1972) stated, "Technology must be understood as an extension of man's capabilities" (p. 230) and further noted, "The impact of technology on man, and the rapid current of change in human relationships, are obvious to all" (p. 230). "One of the

world's leading experts on the connection between learning and technology" (About Marc, para. 1, 2013), believed:

> Technology, rather, is an extension of our brains; it's a new way of thinking. It's the solution we humans have created to deal with our difficult new context of variability, uncertainty, complexity, and ambiguity. The human mind, as powerful as it is, is no longer powerful enough for our world; the old 'tried and true' human capabilities just aren't enough. Technology provides us with the new and enhanced capabilities we need. So technology isn't something we need *in addition* to mental activity; technology is now *part* of mental activity. And we need to use it wisely. (Prensky, 2013, p. 23)

Teacher and Technology Implementation

Teacher usage of technology needs to be effective (Dilworth et al., 2012; Spires et al., 2012). Guskey (1990) stated, "The overarching reason to broaden our thinking about the implementation of new ideas, however, is that a broader view will promote the synthesis of innovative strategies" (p. 15). Oakes and Schneider (1984) noted that teacher input was frequently questioned after the technology had been implemented and all major issues resolved. "Teachers must be encouraged to question current practices without fear of being labeled troublemakers" (Oakes & Schneider, 1984, p. 77). Teacher input and active involvement in computer or technology implementation is necessary (Killian, 1984). Carnine (1984) noted teacher resistance to implementation might be due to various factors most notably: a teacher's strength in technology; their vision of how computers fit in the school day; benefits for added computer responsibilities; and confidence that computers will benefit student learning. Adiguzel, Capraro, and Wilson

(2011) stated, “conceptual and pragmatic gap often exists between a teacher’s intention to use technology—which, in many cases, is mandated by the district and school—and his or her commitment to use it” (para. 19).

Rhodes (1984) presented two routes to implementation; the first being a traditional “top-down” approach and the second required an incremental approach. The participants in the first approach “believe[d] they [were] in the midst of a technological *revolution*. Those progressing down the second route believe[d] they [were] participating in a technological *evolution*” (p. 83). Rhodes (1984) cited the difference in perceptions and attitudes of participants in the revolution or evolution of technology depend[ed] on the role one play[ed]. “In a revolution there are leaders, followers, and others who sit it out and hope it will go away….In an evolution, on the other hand, everyone progresses somewhat equally on the same wave” (Rhodes, 1984, p. 83). Rhodes further clarified the difference between a revolution and an evolution focused on the past and the future. “While revolutions are reactions to the past that focus on a desired future, evolutions deal in the present with the knowledge that the future will be shaped by the ways we work out answers to today’s problems” (Rhodes, 1984, p. 83). Ehrmann (2000) noted a revolution required more than technology tools. “If technology is to enable a revolution to make education more creative, or equitable, or collaborative, or multicultural, everyone who cares about creativity or equity or collaboration or a multicultural approach will need to share what they know” (Ehrman, 2000, para. 29).

Koehler and Mishra (2009) noted there is not a one size fits all method for technology implementation, but rather teachers should find what works best for the content or classroom. Means (2010) cited “extensive literature on ‘best practices’ in

technology implementation does exist" (p. 287) and acknowledged the implementation recommendations were based on "expert opinion or a correlation between the practice and the observed extent of technology use. Only a handful of articles document a correlation between an implementation practice and student learning outcomes" (p. 287).

Teacher perceptions and attitudes. The perceptions and attitudes of educators, if discovered, might help when plans for technology implementation occur (Huebner, 1974). Killian (1984) analyzed survey results from individuals described as those who sought out computer literacy, labeled in this study as seekers, with average teachers. Results of this study revealed the attitudes and perceptions of the seekers were positive in regards to computers, utilizing computers in school and towards computers innovating teaching. It is unknown if the opinions could be attributed to positive personalities or attributed to the method of implementation of devices in the school district environment. "Keeping teachers actively involved in planning and decision making about computer policies, acquisitions, and allocations may go a long way in alleviating computer fear and in promoting voluntary participation in computer projects" (Killian, 1984, p. 81). Carnine (1984) noted teacher resistance to implementation may be due to lack of: strength in technology; vision in how computers fit in the school day; benefits for added computer responsibilities; and confidence that computers will benefit student learning.

In a study to determine teacher's attitudes and perceptions after a laptop initiative, Raulston (2009) found that once teachers received training, teachers were able to incorporate the laptop in the classroom and change classroom practices (p. 65). Raulston also found teachers were concerned about dependency on the laptop and having to "think on your feet when things didn't work right" (p. 66). Prensky (2008b) encountered similar

concerns among teachers “Of course technology will break down. And of course some people may not know what to do until it is fixed” (para. 3). Prensky (2008b) translated this problem as teachers not trusting technology and wanting to teach kids the way the teachers were taught.

Li (2007) conducted a study to determine student and teacher views on technology integration of 15 secondary mathematics and science teachers and 450 students by comparing student and teacher responses to determine possible relationships. All the teachers interviewed noted students like technology, and 10 teachers “indicated that computer technology should only be used when necessary” (p. 388). As stated by Li, 9 of 15 teachers interviewed “would use technology only for strong students. They believed that the use of technology demands time and certain skills. Weak students need to focus on the practice of basic skills rather than wasting time on technology integration” (Li, 2007, p. 389). The teacher participants did not describe preparing students for future jobs as a reason for technology integration and most teachers viewed technology as “no more than an extra workload on both teachers and students, with little educational value for the time and effort invested” (Li, 2007, pp. 391-392).

Huebner (1974) acknowledged the necessity of “recognition” and “reorientation” required of teachers in order to “acknowledge that their action in using technology helps shape the very world that they and their students live in” (p. 393). Moersch (1995) stated “Self-efficacy theory suggested that individuals with a low level of self-efficacy will often choose a level of innovation that they believe they can handle, which may or may not be the best or most effective option” (p. 40). Collins and Halverson (2009) stated:

> One of the rules of adult education is that you can't teach adults something that they are not interested in and don't see the point of learning. Like adults, young people are becoming less and less willing to learn what somebody else thinks is best. They want to decide what they need to learn. (p. 17)

With prior claims to lessen workloads for teachers, technology was actually causing more work (Collins & Halverson, 2009; Means & Olson, 1994; Peck & Dorricott, 1994). Means and Olson (1994) noted the evolving nature of technology and the inability for teachers to master usage. "Especially at first, the technology itself poses challenges, like learning to set up equipment, remembering software commands, and troubleshooting system problems" (Means & Olson, 1994, para. 29). O'Neil (1995) stated, "Perhaps the biggest barrier to technology use is time: time for training, time for teachers to try out technologies in their classrooms, time to talk to other teachers about technology" (para. 10). Dappolone (2013) acknowledged the initial time investment when technology tools were utilized, but believed the minor commitment for maintenance was positive. "Weaving technology into the culture of your classroom ensures that the technology does not become a distraction" (Dappolone, 2013, p. 72).

Mindset. Teachers must change their mindset regarding technology and use of technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2010). Dweck (2006) identified two different mindsets: fixed and growth: "the view you adopt for yourself profoundly affects the way you lead your life. It can determine whether you become the person you want to be and whether you accomplish the things you value" (p. 6). A "fixed" mindset is the belief that you cannot change and starts early on in life and can be negatively reinforced by teachers who believe students have a fixed level of intelligence

(Dweck, 2006). The "growth" mindset "is based on the belief that your basic qualities are things you can cultivate through your efforts. Although people may differ in every which way…everyone can change and grow through application and experience" (Dweck, 2006, p. 7). The mindset to which one leans towards affects ones approach to teaching. Growth-mindset teachers have a love of learning and utilize teaching as a means to grow as a learner while fixed-mindset teachers view their job as teaching the knowledge they have (Dweck, 2006). In the researcher's opinion, the issue of mindset, specifically the mindset of teachers, affects how technology is or can be implemented, and affects teachers views on professional development.

Professional development. Teachers need high quality professional development and ongoing support when implementing technology (Bouterse et al., 2009; Spires et al., 2012). Insufficient training is a common theme regarding professional development (Caverly et al., 1997; Koehler & Mishra, 2009). Moersch (1995) noted professional development for technology integration more often is designed with invalid assumptions regarding educators attending: "participants are easily able to make connections between the technology they have available and their instructional curricula and if the participants are ready and willing to initiate changes in their instructional practices" (p. 40). Caverly et al. (1997) continued to see teacher training as the reason why students were not learning more effectively. With a preference for the term *educating* instead of *training*, Caverly et al. (1997) designed a generational model in which teachers [were] educated on how to incorporate technology into the curriculum. "In Piagetian terms, we help teachers *accommodate* new knowledge rather than simply *assimilate* another process or piece of curriculum. Because technology changes rapidly,

technology training is an ongoing need—not a short-term fix" (Caverly et al., 1997, para. 3). The generational model teaches the first generation of teachers, and then they teach the second generation who subsequently teaches the third generation based on the social-constructivist approach (Caverly et al., 1997). After conducting a meta-analysis on staff development, Wade (1984) recommended: vertical staff development between elementary and secondary teachers; the encouragement of teachers to participate in programs provided by the state or federal government; incentives; independent study staff development in lieu of a traditional format; recommended that instructors of staff development create clear objectives and be responsible for teaching; and utilize methods such as observation and practice instead of lecture and discussion. "There is no 'magic formula' for effective inservice programs" (Wade, 1984, p. 53). Glatthorn (1987) promoted a Cooperative Professional Development model where teachers work in small teams on an ongoing basis and engage in professional dialogue, curriculum development, peer supervision, peer coaching, or action research. "The [technology] implementation process, like the programs themselves, [are] collaborative, involving cooperation between the district and the member schools and between administrators, supervisors, and teachers" (Glatthorn, 1987, p. 35). Garmston and Wellman (1994) acknowledged the likelihood of constructivist practices naturally employed in "work with adults in faculty meetings, committee work, and workshops long before the concept of constructivism was revived. We believe an understanding of constructivism is essential for anyone wishing to maximize adult learning" (para. 9).

Koehler and Mishra (2009) stated, "At the heart of good teaching with technology are three core components: content, pedagogy, and technology, plus the relationships

among and between them" (para. 7). These three components combined create the foundation for what is known as TPACK (Koehler & Mishra, 2009). Dilworth et al. (2012) defined the framework for TPACK as "three essential types of knowledge—technological knowledge, pedagogical knowledge, and content knowledge" (p. 11). Lee Schulman was credited with the creation of TPACK (Bull & Bell, 2009; Dilworth et al., 2012; Koehler & Mishra, 2009) and coined the term in 1986 (Bull & Bell, 2009). TPACK, as cited by Spires et al. (2012) as one of the five strategies, which supersede the mode of professional development delivery, considered for a one-to-one training environment. "The TPACK model can be used as a theory-to-practice heuristic during professional development sessions with teachers as they are making necessary pedagogical shifts to take advantage of the new learning ecology in the 1:1 classroom" (Spires et al., 2012, p. 242). Spires et al. (2012) further stated teachers in one-to-one environments typically begin professional development via the new technology.

Quinn et al. (1983) noted staff development as an integral component and recommended teacher involvement in the early stages. "By involving teachers in developmental activities, ownership of the developed products will be enhanced, and the training key teachers obtain can be systematically passed along to others" (Quinn et al., 1983, p. 67). Levin and Schrum (2013) found their study schools "provided ongoing, differentiated professional development for their teachers and have worked to improve their school's culture and climate and transform their curriculum and instruction. They did so nearly simultaneously with implementing 1:1 computing environments" (p. 54). Spires et al. (2012) stated, "Given the effect computers have in the classroom, high

quality and well-designed teacher professional development initiatives become even more crucial for 1:1 learning environments" (p. 234).

Our Changing Students—Yesterday, Today, and Tomorrow

Teens develop unique patterns of language and ways to communicate (Achilles & Crump, 1978; Tell, 1999). Achilles and Crump (1978) noted the culture of youth and subsequent complaints from older generations as a concern throughout history with no solution due to the existence of cultural differences. "When adults start to use the 'youth culture' language, members of the culture find new words or word usages and develop new verbal language boundaries. The adults are then once again on the outside looking in!" (Achilles & Crump, 1978, p. 512). Original styles of communication can be a challenge for teachers within the classroom. Barbieri (1978) noted youth "endlessly test, question, reject, or finally come to terms with, their teachers' authority and belief" (p. 505). Adults should recognize but not adopt youth culture (Achilles & Crump, 1978). Kauchak (1978) acknowledged the children of 1978 were different from generations past and stressed to be aware "that the children we teach are products of their environment. An important part of that environment is the media, and unless teachers recognize this, they will be attempting to teach space-age children with horse and buggy perspectives" (p. 532). The idea that children today are different is not a new concept. Tell (1999) noted, "generation gaps have always existed, and older generations have always disparaged the activities and interests of the young, the way we talk about teens has shifted" (para. 4).

Prensky (2001) recognized a natural divide in the use of technology between digital natives and digital immigrants, a problem of disconnection that affects classroom

instruction. Digital natives are individuals who have grown up with digital technologies and digital immigrants are individuals that have begun using technology later in life (Prensky, 2001). Palfrey and Gasser (2008) defined digital natives as individuals born after 1980. "These kids are different. They study, work, write, and interact with each other in ways that are different from the way that you did growing up" (Palfrey & Gasser, 2008, p. 2). Palfrey and Gasser (2008) further described digital natives completing daily tasks but with their digital life spin. "They often meet each other online before they meet in person….They're more likely to send an instant message (IM) than to pick up the telephone" (Palfrey & Gasser, 2008, p. 2). Geck (2006) defined the generation born in or after 1990 as Generation Z. "Although Generation Z is not yet defined in the dictionary, the term is sometimes used to describe the already-existing net generation of teenagers born in or after 1990 in technologically advanced countries" (Geck, 2006, para. 1). Rosen (2011) noted a different name for the generation Z described by Geck (2006) as the iGeneration and indicated this generation represented individuals born from 1990 on. The "i" stands for the multitude of the popular digital products, most products by Apple, "and the highly individualized activities that these technologies make possible. Children and youth in this new generation are defined by their technology and media use, their love of electronic communication, and their need to multitask" (Rosen, 2011, para. 10).

Students and technology. Technology has been a part of everyday life for children (Davis, 1968; Geck, 2006; Means, 2010; Prensky, 2013; Richardson, 2012; Swan et al., 2005; Tell, 1999; Turkle, 1984). They utilize devices with ease and are the teachers of adults (Tell, 1999). Palfrey and Gasser (2008) noted, "Just because Digital Natives learn differently from the way their parents did when they were growing up

doesn't mean that Digital Natives are not learning" (p. 240). Students need to be creative thinkers (Brooks, 1990; Dede, 1989; Ferriter, 2011a; Hertz & Aungst, 2011; Lesgold, 1986; McCain, 2005; Saavedra & Opfer, 2012; Spires et al., 2012) and technology tools enable creativity (Tell, 1999; Zhao, 2010). "Instead of providing an isolating and mind-numbing experience, technology is a creative and exciting tool that gives teens freedom—to express themselves, to get information, and to learn" (Tell, 1999, para. 21). Turkle (1984) reported, "Children in a computer culture are touched by the technology in ways that set them apart from the generations that have come before" (p. 165).

Davis (1968) presented a scenario with children utilizing technology such as the television and transistor radio to view news, listen to music, and hear the weather report. "Technology and communications media are so much a part of their lives—and have been ever since they were born" (Davis, 1968, p. 65). Rosen (2011) equated technology usage as common and an everyday activity; the devices may change and children may change but technology usage will remain a daily task. "It doesn't mean that teachers should simply assign work on computers and let students find their own way. It doesn't mean providing technology in the classroom for technology's sake" (Rosen, 2011, para. 17). Zhao (2010) noted, "It may not be physical or tangible, but the virtual world is indisputable and has a significant economy. If we consider the amount of time young, digital natives spend in virtual spaces…we cannot say that this part of their world is not real" (p. 15).

In an anonymous online survey, to determine hours per day usage, of a variety of technology activities, conducted at the George Marshall Applied Cognition Laboratory, found the Net Generation, and the older teens of the iGeneration consumed 20 or more

hours a day (Rosen, 2011). Li's (2007) student surveys revealed students "want to learn in more effective, efficient and fun ways" (p. 392). Li's results indicated the following: students need technology skills for the workforce; students embraced technology due to its functions; and students supported technology integration due to its importance for the future. "They recognize that the world has become technologically oriented; hence, they need to master current technology to meet the demands of the workplace" (Li, 2007, p. 386).

Technology as motivation to learn. Motivation to learn by use of technological devices may be temporary. "Lasting motivation comes from a sense of involvement in, or commitment to, goal achievement or need reduction. These perceptions on the part of the learner come not from machines; they must be aroused from within" (Gold, 1963, p. 437). The teacher has a key role in a student's motivation to learn. Gold (1963) stated, "The machine is neither purpose nor end; it is a means which the teacher uses after having helped uncover needs and goals" (p. 437). Gold (1963) described five known truths about the process of learning that may help with new devices that require the learner to synthesize the learning experience: the teacher to know the learner; the learning to be meaningful; the process of learning is a whole experience for the learner; and learning is individual but can be stronger in a group setting. Li's (2007) research determined "increased motivation and confidence" (p. 387) as a theme from student survey data. "More than 18% of the students cited this reason as to why they found technology useful. Many students emphasized using games or other 'fun' ways, from virtual reality to simulation and to the Internet" (p. 387). Li noted student excitement about technology integration and "believed it could enhance learning. This attitude was

mainly reflected in their comments from four perspectives: (1) increased efficiency; (2) improved pedagogical approaches; (3) [preparation] for the future; and (4) increased motivation and confidence" (Li, 2007, p. 387).

Game-like formats/edu-tainment. The utilization of games in education was viewed as a motivation to learning (Murray & Olcese, 2011; Okan, 2003; Prensky, 2006). Rogers and Goodloe (1973) advocated for the use of simulation games in education as a way for students to build inquiry skills, and have teachers facilitate student learning and "free students to learn; that is, the teacher must become a guide and resource rather than the primary source and direct conveyor of knowledge. Teachers must be willing to accept activity outcomes and students' attitudes with an open mind" (p. 730). Trumbull (1986) observed and interviewed fifth grade students over the span of one semester and noticed the emphasis on using computers to play games at school and at home. Trumbull (1986) noted increased competitiveness, decreased cooperation, and increased boredom among the students utilizing game like software. Trumbull (1986) also noted that even though many students were bored with the drill and practice format, limited game choices and predictable rewards, all of the students enjoyed computer work.

Jones and Paolucci (1999) referenced the increase of digital technology use in education in the 1990's while Okan (2003) noted this rise as "edutainment" (p. 255) software. "Edu-tainment' is a hybrid genre that relies heavily on visual material, on narrative or game-like formats, and on more informal, less didactic styles of address" (Okan, 2003, p. 255). Edutainment thrives on the idea that learning is fun and engages the learner with visuals and animations (Okan, 2003). "The true secret of why kids spend

so much time on their games is that they're learning things they need for their twenty-first century lives" (Prensky, 2006, p. 5).

Okan (2003) warned of students developing an attitude towards learning. "Equating learning with fun suggests that if students are not enjoying themselves, they are not learning. In other words, learning becomes an obstacle that learners need to overcome" (p. 258). Topics classified as not fun should be taught regardless of student interest (Sprague & Dede, 1999). "Instead, students' knowledge, experiences, and interests occasionally do coalesce around an urgent theme….Teachers should relate concepts and skills to be learned to students' current interests" (Sprague & Dede, 1999, p. 8).

Collins and Halverson (2009) acknowledged computer games as an excellent way to give feedback and to gradually progress learners towards complex tasks. Goodwin and Miller (2012) suggested creating more video game- like classroom environments by engaging students with relevant, timely and specific feedback. "Vague feedback can have similar negative effects on students, resulting in uncertainty, decreased motivation, and even diminished learning" (Goodwin & Miller, 2012, para. 8). Goodwin and Miller questioned how many students would continue to play video games if they had to wait for the results. "The optimal timing of feedback seems to depend on the nature of the learning task. When students are acquiring new, complex knowledge or skills, real-time checks for understanding and tips can prevent them from developing misconceptions or incorrect practices" (para. 10).

Moore (2003) supported feedback in the form of formative assessment and the use of technology. "For assessment to challenge higher order thinking skills of students,

technology should be integrated to provide relevant and current information. The world outside the classroom has changed significantly due to technology" (Moore, 2003, p. 26). Moore acknowledged students learn differently and reinforced combined teaching tools of "traditional and alternative assessment techniques with the infusion of technology, needs to be incorporated into the curriculum, and both should be used in measuring the competency of students" (p. 26). Others believe the product of immediate teacher feedback could lead to student dependency on the teacher (Goodwin & Miller, 2012; McCain, 2005).

Facilitate student learning. Teachers must facilitate student learning with technological devices to create meaningful learning experiences (Gold, 1963; Kulik, 1983; Peck & Dorricott, 1994; Spires et al., 2012). Dede (1983) proposed computers as training devices for students as well as the teacher's to educate students. Prensky (2008a) advocated technology's prime role as a support for students to teach themselves with teacher guidance while Lesgold (1986) supported the use of computers "as assistants to facilitate and extend learning and problem solving. When used this way, computers [could] certainly help children prepare for a high technology future by assisting them to develop those higher-level thinking and learning processes" (Lesgold, 1986, p. 11). Learning can occur from both teacher facilitation and the use of technology (Davis, 1961). "When educators allow students to interact with technologies in meaningful ways for significant periods of time, the growth that follows will encourage educators to try new things" (Peck & Dorricott, 1994, para. 21).

Involvement and ownership of learning. Students today expect learning to be individualized (Carroll, 2000; Richardson, 2012) and they expect to be involved in the

process of their instruction (Richardson, 2012; Torkelson, 1972). Torkelson (1972) believed students should decide on their goals, the direction for learning and assume all consequences for choices made. Richardson (2012) supported student created learning experiences to meet the goals of the class and expectations for the school and state. The teacher would expect to receive from each student a project or assignment that could look different, and the important element is the student learning through his or her interests. "Helping students connect course goals to their own passions is a key ingredient of success. This, too, requires being comfortable with pushing traditional boundaries" (Richardson, 2012, para. 14). Richardson indicated this type of environment involved "risk and reward" (para. 13). "Despite the promise of personalized learning… many educators wonder whether the concept goes far enough in preparing students for the wide array of learning opportunities outside the classroom" (Richardson, 2012, para. 21). Collins and Halverson (2009) noted learner control as essential in creating individuals who seek out learning. Control over learning can be facilitated with technologies (Collins & Halverson, 2009; Mehlinger, 1997; Moore, 2003). "Learner control can be fostered by giving kids the tools to support their own learning, such as access to the web…and computer based games that foster deep knowledge and entrepreneurial skills" (Collins & Halverson, 2009, p. 132).

21st Century Skills and Education

21st century skills are fundamental to modern education systems. Students need to develop critical thinking skills for a 21st century education (Hertz & Aungst, 2011; McCain, 2005; Saavedra & Opfer, 2012). McCain (2005) promoted critical thinking skills and stated, "The issue of foremost importance is to develop thinking skills in our

students so that they will be able to utilize the power of technological tools to solve problems and to do useful work" (p. 84). McCain also noted individuals with problem solving and technology skills "will have great power and will be effective, productive participants in families, communities and businesses" (p. 84). Students need to synthesize knowledge instead of presenting the same information back to the teacher, provided by the teacher (Collins & Halverson, 2009; Hertz & Aungst, 2011; Marzano & Arredondo, 1986; Quinn et al., 1983; Saavedra & Opfer, 2012). Collins and Halverson (2009) noted the importance of individuals to obtain information via technological tools to increase their own knowledge base, but stressed "they also need to know how to integrate information from different sources, to evaluate the reliability of those sources, and to use the powerful computer tools available to them to analyze the information and present it to others" (p. 46). Hertz and Aungst (2011) found, "students need to demonstrate problem solving, creative and critical thinking, leadership and collaboration, and global awareness and communication. Students who exhibit these skills are empowered to take control of their own learning. They are creators, not simply absorbers" (para. 4).

The need for real-world skills is evidenced by "the working world [that] has changed radically in the last twenty-five years, there is an increased need for educators to prepare students differently for success in life in the 21st century" (McCain, 2005, p. 7). McCain (2005) described two different types of skills: school skills and real-world skills, as both necessary education objectives. School skills prepare students by "focus[ing] on training students to perform well on written tests to get good grades" (McCain, 2005, p. 5). McCain (2005) specified, "School skills are mainly concerned with the assimilation

of content. They are based on the notion that information alone is all we need to give students to prepare them for life" (p. 6). McCain further clarified that school skills have value and provide students with positive feedback, but questioned, "Are school skills the kind of skills that students will need to be successful when they leave the [educational] system?" (p. 7). Cookson (2009) noted, "The 21st century mind will need to successfully manage the complexity and diversity of our world by becoming more fluid, more flexible, more focused on reality, and radically more innovative" (para. 9). Cookson described "four elements of the 21st century mind" (para. 9) as: critical reflection, empirical reasoning, collective intelligence and metacognition. Collins and Halverson (2009) noted, "Enthusiasts argue that trying to prepare students for the 21st century with 19th-century technology is like teaching people to fly a rocket ship by having them ride bicycles" (p. 10).

21st century skills. The Partnership for 21st century skills have written extensively on the concept of 21st century thinking and the specific skills and content knowledge our children will need to succeed (see Figure 1). Greenhill et al. (2010) wrote, "The P21 framework for 21st century teaching and learning has been refined over a six year period with input from hundreds of educators, business leaders, community leaders, parents, students; and policymakers" (p. 8). Trilling (2010) acknowledged the skills required by the Partnership for 21st Century Skills are not new and noted the change is "how these skills are now being acquired—through the use of modern technologies and digital literacy skills that support the learning of all the other skills. This is what gives these age-old skills their 21st century twist" (p. 12). Saavedra and Opfer (2012) acknowledged the variety of descriptions utilized to describe 21st century

skills. "All 21st-century skill definitions are relevant to aspects of contemporary life in a complex world. Most focus on similar types of complex thinking, learning, and communication skills, and all are more demanding to teach and learn than rote skills" (p. 8). The ability to generalize or transfer skills and/or knowledge is especially difficult for students. "Yet the importance of transfer brings us back to the fundamental rationale for learning 21st-century skills in the first place—so students can transfer them to the economic, civic, and global contexts that demand them" (Saavedra & Opfer, 2012, p. 10).

21st century skills-information, media and technology skills. The utilization of technology in a 21st century education provided students a variety of new ways to cultivate essential skills such as "problem solving, critical thinking and communication skills. Technology can help students practice transferring those skills to different contexts, reflect on their thinking and that of their peers, practice addressing their misunderstandings, and collaborate with peers" (Saavedra & Opfer, 2012, pp. 11-12). "Technology is often discussed as an essential part of a 21st century education" (Hertz & Aungst, 2011, para. 5). Information, media, and technology skills encompass concepts the 21st century learner needs to evaluate, manage, create, research, and communicate (Greenhill et al., 2010). Spires et al. (2012) stated, "the addition of technology ubiquity within the classroom does not in and of itself add value. Value is added depending on the ways the technology ubiquity is applied in the overall design for learning" (p. 235).

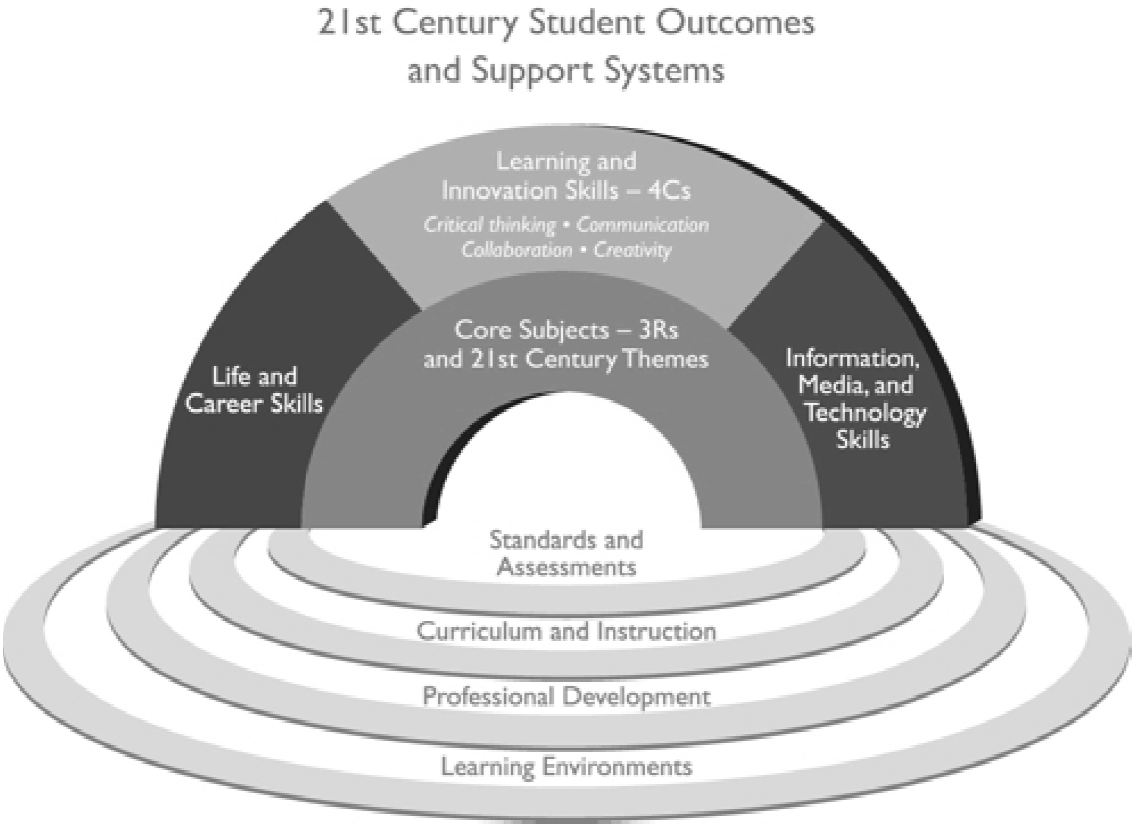

Figure 1. *21st Century Student Outcomes and Support Systems*

Permission to use graphic (see Appendix D) courtesy of Partnership for 21st Century Skills (www.P21.org).

McCain (2005) believed problem-solving skills were more important than technology skills and stressed the importance of the intellect controlling the technology over the tool. "In the technologically saturated world of the 21st century, it would be easy to assume that the answer is to simply equip students with up-to-date technology skills. Technology skills are important, but they are not enough" (McCain, 2005, p. 15). Prensky (2013) contrasted with McCain's view on technology and education by noting, "In fact, in the 21st century, technology is *the* key to thinking about and knowing about the world" (p. 23). Prensky (2013) believed technology as the "number one skill students need to take from school to succeed" (p. 23). Levin and Schrum (2013) studied "eight

secondary school districts throughout the United States that exemplified the creative use of technology in k-12 schools" (p. 51) and found the goals to be learning-centered and relevant, not technologically oriented. "In other words, their goal was to educate students for work and life in the 21st century, not just to add technology" (Levin & Schrum, 2013, p. 51).

21st century teachers. Teachers will need 21st century skills to teach a blend of traditional core subjects and 21st century knowledge and skills (Greenhill et al., 2010). Teacher preparation programs must change if schools are going to change (Carroll, 2000). "If we want schools to be different, we must start today to prepare teachers differently... *significantly differently*" (Carroll, 2000, para. 4). "New teacher candidates must be equipped with 21st century knowledge and skills and learn how to integrate them into their classroom practice for our nation to realize its goal of successfully meeting the challenges of this century" (Greenhill et al., 2010, p. 3). Cookson (2009) stated teachers would cease being managers of students and "would learn alongside their students, creatively adapting curriculum to their students' needs. Like any creative effort, this collective journey would include errors, lack of good information, and false starts—a process of which Socrates would approve" (para. 31).

Ferriter (2011b) believed successful 21st century teachers were "digitally resilient" (para. 1) and when technology failed, teachers remained determined. "Digital resilience [is defined as the] determination in the face of blocked websites, failing services, antiquated tools, and technology decisions that aren't aligned with a new vision of teaching and learning" (Ferriter, 2011b, para. 2). McCain (2005) noted teachers' inability to connect school and work may be due to teachers spending "little time in jobs

outside the school system and thus [lacking] a broad base of working-world experience to draw upon" (p. 22).

Lesgold (1986) acknowledged the importance of technical skills but noted specific knowledge as less important in the future; "the curriculum must teach children to learn new information and skills efficiently. We can be pretty sure that the world of the future will be dominated by the person who is a 'quick study" (p. 8). Palfrey and Gasser (2008) stated, "In order for schools to adapt to the habits of Digital Natives and how they are processing information, educators need to accept that the mode of learning is changing rapidly in a digital age" (p. 239). Ferriter (2011a) believed he could prepare students for the 21st century without any technology, noting the skills of communication, collaboration and creative problem solving as essential for success. "You don't need technology to foster higher-level thinking skills….Even in the increasingly high-tech world of the 21st century, what students need first and foremost are effective thinking skills" (McCain, 2005, p. 84).

Cheves and Parks (1983) noted the teacher would determine what problems to teach, and the students would form concepts for problem solving based on exposure. "Thus, every activity not only teaches students problem-solving skills but also teaches what problem solving is (and is not)" (Cheves & Parks, 1983, p. 55). Saavedra and Opfer (2012) noted the approach to encourage students to practice higher order thinking skills by switching around what would typically be taught in the classroom. Educators should consider lower order thinking skills, with what typically would be homework, and consider higher order thinking skills within the classroom, a practice popular with our international competitors in Finland and Singapore. Greenhill et al. (2010) stated, "If we

commit to a vision of 21st century knowledge and skills for all students, it is critical that we support educators in mastering the competencies that ensure positive learning outcomes for students" (p. 11).

21st century students. The increased need for thinking skills resulted from a societal change. The skills important in the past have changed and thinking skills are now necessary to prepare students for the future (Dede, 1989; Ferriter, 2011a; Marzano & Arredondo, 1986; O'Neil, 1992; Saavedra & Opfer, 2012). McCain (2005) stressed the critical nature of problem-solving skills to enable students to become logical and independent thinkers "for solving personal and household problems [similar to] solving work-related problems. What we are really talking about here is providing students with life skills. It is time for educators to reconsider the relevancy of what we teach" (p. 10). Prensky (2008b) believed teachers focused on the basics or a "backup education" (p. 2) are not preparing students for future jobs but rather holding students back. O'Neil (1992) indicated students lacked the necessary skills for the available jobs. Due to our fast-paced culture, the best methods to teach the basics are constantly changing. LaConte (1983) supported teaching students the basics and letting the students handle the future but "in an era in which five years of technological and social development can produce as much change as occurred in half a century, the future is much more insistent" (p. 40).

Noble (1984) noted "the 'higher' the technology introduced into a job, the lower the skills required by that job….checkout scanning, or word processing, for example, most of the competence is built directly into the machines themselves. Smarter machines require less-skilled workers" (p. 605). O'Neil (1992) cited a report developed by the "U.S. Department of Labor's Secretary's Commission on Achieving Necessary Skills,

What Work Requires of Schools" (p. 8) as having some answers. "All students, the commission says, should learn basic reading, writing, and math skills, to think critically, to work in groups, to choose and apply appropriate technologies" (O'Neil, 1992, p. 9).

Summary

Technology is not a cure-all for educational problems (Dede, 1989; LeFevre, 2004; Torkelson, 1972). "Computers alone don't make the difference. Computers have to be in the right hands and use in the right ways" (LeFevre, 2004, p. 81). Fox (2009) stated the lasting benefits of technology in education is "more than just the distribution of machines, but creates a technology-rich learning environment that is supported by on-going professional development, technology coaches, high-quality curriculum, sufficient broadband access, and administrative leadership" (p. 26). Richardson (2013) reminds those in education that "it's not about the tools. It's not about layering expensive technology on top of the traditional curriculum. Instead, it's about addressing the new needs of modern learners in entirely new ways" (p. 12). *Apple Classrooms of Tomorrow-Today* (Apple, 2008) explained students today are different and require different teaching methods. "Not surprisingly, students today expect to learn in an environment that mirrors their lives and their futures—one that seamlessly integrates today's digital tools, accommodates a mobile lifestyle, and encourages collaboration and teamwork in physical and virtual spaces" (Apple, 2008, p. 19).

Technology has reduced certain job fields and created new ones; as with fast pacing changes it is hard to predict what exactly students should be taught (Dede, 1989; Marzano & Arredondo, 1986). "Certain technologies have definitely found niches in education, but the technology of the last two decades has changed schools far less than it

has the worlds of work, entertainment, and communication" (Means & Olson, 1994, para. 2). Students and teachers will need a combination of technology awareness and problem solving skills to handle future technologies not yet created. As educators work towards educating students for jobs not yet created- current literature supports a future workforce characterized by competition, innovation and one that is technologically enhanced (Apple, 2008; Greenhill et al., 2010; Li, 2007; Spires et al., 2012).

In Chapter Three a review of the methodology utilized by the researcher is presented along with background information for the study school district, demographics, participants, data collection procedures and data analysis procedures for quantitative and qualitative data.

Chapter Three: Methodology

The study school district viewed the iPad device as a technological tool that could provide new opportunities and bridge technology gaps left by other technology tools and devices (District Content Facilitator, personal communication, April 7, 2011). "Technology is rapidly changing how we teach and how we learn. Emergent technologies offer opportunities to understand concepts in deeper, often different, and more meaningful ways" (Dilworth et al., 2012, p. 11). The purpose of this study was to measure the perceptions of administrators, classroom teachers, and professional support staff on the use of the iPad device for instruction and daily educational activities.

This study utilized a mixed methods approach with qualitative and quantitative measures to ascertain the perceptions of K-12 educators as to the usefulness and effectiveness of the iPad device as a classroom instructional tool. Johnson and Onwuegbuzie (2004) cited mixed method research as "an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research" (p. 17). The mixed method approach utilized by the researcher was a triangulation design (Terrell, 2012). "In a triangulation design, the researcher simultaneously collects both quantitative and qualitative data, compares the results, and then uses those findings to see whether they validate each other" (Fraenkel & Wallen, 2006, p. 443). Maxwell (2005) stated triangulation design "reduces the risk that your conclusions will reflect only the systematic biases or limitations of a specific source or method, and allows you to gain a broader and more secure understanding of the issues you are investigating" (pp. 93-94).

Chapter Three includes a review of the research methods, description of the research site, background of the school district, research instruments and materials, research procedures, and participants.

Research Questions and Hypotheses

Hypotheses:

H_{01}: Classroom teachers who employ the iPad device as a classroom- learning tool will not perceive positive effects on their classroom strategies and methods as measured by their ratings on a survey containing a Likert-type scale.

H_{02}: Administrators in schools with teachers who employ the iPad device as a classroom-learning tool will not perceive positive effects of the classroom strategies and methods of teachers as measured by their ratings on a survey containing a Likert-type scale.

H_{03}: Professional support staff who employ the iPad device as a learning tool will not perceive positive effects on the strategies and methods they use to support classroom instruction as measured by their ratings on a survey containing a Likert-type scale.

Research Questions:

RQ1: How do classroom teachers in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?

RQ2: How do administrators in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ3: How do professional support staff in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ4: How do classroom teachers perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ5: How do administrators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ6: How do professional support staff perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

The Research Site

The implementation of this study occurred within a Midwest school district including five elementary schools, two middle schools, one high school, and one alternative school. The school district was defined as a small suburban district with 5,301 students (Executive Secretary, personal communication, July 16, 2013), 392 teachers, 318 support staff, 58 Special School District Staff, and 26 administrators in 2012-2013 (Key Facts 2012-2013, 2012). The student ethnicity at the time of this study was 2.2% Asian, 14% Black, 2.7% Hispanic, 3.4% Multi-Racial, .2% Native American, .05% Pacific Islander, and 77% White and 16.3% qualified for Free and Reduced Lunch (Executive Secretary, personal communication, July 16, 2013) compared to approximately 46% within the researched state (District Demographic Data, 2013). Approximately, 12.83% of students were identified with an educational disability (Executive Secretary, personal communication, July 16, 2013).

The researcher obtained permission from district officials to conduct research in the form of an online survey in nine schools and interview district content facilitators located at the district office. The study school district purchased iPad devices in the 2010-2011 school year for approximately $15,000 (District Content Facilitator, personal communication, July 8, 2013) with funds from the district technology and the technology facilitator budgets. The Technology Leadership Group (TLG) consisted of teachers interested in technology implementation throughout all district buildings and assisted in making technology purchasing decisions for the district and assist colleagues in the implementation of technology used in the classroom. Throughout the year, TLG members were encouraged to utilize the Moodle site as a way to pose questions, offer support and communicate with other TLG members regarding the iPad. The iPad pilot concluded with an exit survey administered online and created by the district technology facilitator for the pilot study. Part of a presentation to the study school district board of education, presented a district wide technology survey conducted in 2011, separate from the iPad pilot exit survey; results discovered of the 189 respondents 60% marked “very willing” and 35% marked “open” to adjusting to a laptop and/or iPad for instruction (Board of Education, 2012, p. 8).

Interest in the iPad grew throughout the district evidenced by an increase in purchase requests of the device the following 2011-2012 school year (District Content Facilitator, personal communication, April 7, 2011). Following the numerous requests, various district groups received individual iPad devices: Library Media Specialists, Instructional Specialists, Teachers of Gifted Students, and Building Administrators. In

addition to the purchased iPads for individuals, seven schools within the researched district received iPad carts to for instruction with students.

The district operated a three-year cycle technology refresh in the past and moved to an annual needs-based assessment structure. The 2011-2012 TLG analyzed potential scenarios for purchases in preparation for the upcoming district technology purchase. A variety of scenarios were analyzed regarding the iMac desktop computer, MacBook Pro laptop computer, Mac Mini desktop computer, and iPad. The TLG supported the ongoing use of existing desktop computers, and agreed to purchase new 13inch MacBook Pro Laptops and iPad devices in an effort to move towards mobile technology integration (Board of Education, 2013b). A group of teachers, principals, and district administrators met to review the proposal by the TLG and to develop an instructional technology vision for the district. The school board approved the plan supported by the TLG in May 2012 (Board of Education, 2012b, p. 8).

The rollout of iPad devices to teachers began during summer break, 2012, with all participating teachers receiving iPad devices by fall 2012. Each individual received a required initial training session and optional additional training during the 2012-2013 school year. The TLG structure changed in the 2012-2013 school year limiting participating teachers to two representatives from each elementary, three representatives from each middle school, and eight representatives from the high school. December 2012, after the participants had an opportunity to work with the technology, district administrators, facilitators, technology staff and members from the school board visited public schools in Springfield, Illinois to observe the implementation of classroom use of iPads with a one-to-one student-to-device ratio (Board of Education, 2013b).

The school board approved the purchase of iPad Mini devices for TLG members to utilize with approximately 625 students (Board of Education, 2013a, p. 9). The TLG members participated in a "scout" instead of a "pilot" program implementing the iPad Mini. TLG teachers, students and parents participated in online surveys while building administrators and technology facilitators conducted observations. Survey results, not a part of this study, were presented at the May 2013 school board meeting with results supportive of one-to-one iPad implementation. Proposed rollout of iPad Mini devices (see Table 1) to selected students were discussed on May 20, 2013 (Board of Education, 2013b, p. 8). The school board approved the rollout of iPad devices to all students in the district beginning August 2013 (Board of Education, 2013b, p. 8).

Table 1.

Student iPad Mini Rollout

	2013-2014		**2014-2015**	
Grade	Semester 1	Semester 2	Semester 1	Semester 2
K				X
1				X
2				X
3		X	X	
4		X		
5	X			
6		X		
7		X		
8	X			
9	X			
10				
11			X	
12			X	

Note. After a student has received a personal portable device the student will continue to have that specific device from year to year and school to school.

The study school district defined a scout program as sending TLG members out prior to a larger-scale implementation to gather information, explore possibilities, and

experience the technology. The collected data is used to inform decision-making, help move forward, adjust course if needed, and to progress as smoothly as possible. This concept is similar to a pilot. The intention behind a scout, which differs from a pilot, is to figure out the best plan of action to move forward with the technology where a pilot may or may not implement based on collected data (Board of Education, 2013a, p. 9).

Participants

The researcher obtained permission from district officials to invite participants from nine schools in the district to complete an online survey containing a Likert scale and open-ended questions, along with the researcher's ability to interview district content facilitators, in February 2012. The researcher identified 86 individuals as having an iPad device or regular access to a cart of iPads. Shortly after receiving approval from the university's Institutional Review Board (IRB) for research involving human subjects, the study school district school board coincidentally approved the purchase of iPad devices for all certified staff. The researcher decided to open the study to all certified staff and administrators who met the criteria of having an iPad device.

All teachers, building administrators, and professional staff in possession of a district iPad device or who regularly accessed a cart of iPads for classroom use were contacted by email to participate in an online participant survey, each role-specific (see Appendices A, B, and C). All surveys were online and accessed by Survey Monkey, estimated to take less than 30 minutes to complete. All district content facilitators were contacted and invited to participate in a one-on-one interview (see Appendix E) with the researcher that lasted approximately one hour. All participants received and signed an informed consent letter. The informed consent letter indicated no foreseeable risks or

benefits to participants; noted participation as voluntary with the option to withdraw from the research or choose not to answer any statements; and all individuals would remain anonymous in the reporting of results.

Sample Selection

Participants in this study included administrators, classroom teachers, professional support staff, and content facilitators working in the researched Midwest public school district at the time of the study. All participants were in either year one or year two of iPad device utilization. The research population consisted of 488 individuals. The convenience sample consisted of 58 total participants: one administrator, 41 classroom teachers, 13 professional support staff, and three district content facilitators. The researcher utilized a convenience sample. Convenience sampling occurs when individuals are studied based on availability (Fraenkel &Wallen, 2006). "In general, convenience samples cannot be considered representative of any population and should be avoided if at all possible. Unfortunately, sometimes they are the only option a researcher has" (Frankel & Wallen, 2006, p. 100).

Data Collection and Analysis Procedures-Instruments/Materials Used

Fraenkel and Wallen (2006) noted it is preferred to utilize a pre-existing instrument. The researcher, with the assistance of the researcher's advisor, created the survey instruments to address the research questions and hypothesis statements of the study. The instruments used to collect primary data were all written-response instruments: Likert-scaled surveys and face-to-face interviews. The researcher utilized a cross-sectional survey to assess perceptions regarding the iPad device. Fraenkel and Wallen noted for a cross-sectional survey "information is collected at just one point in

time, although the time it takes to collect all of the data may take anywhere from a day to a few weeks or more" (p. 398).

The researcher created three online role-specific surveys to address three separate populations: administrators, classroom teachers, and professional support staff. The surveys were online and the study school district provided use of the district professional Survey Monkey account to the researcher. The time commitment to complete the survey, for a specific group, was approximated at 20-30 minutes for a range of 17-27 questions. Participants were informed, prior to accessing the survey link, of their right to not answer any questions and to withdraw their consent in the study at any time. "Advances in computer technology in the past 30 years have made computer-assisted survey methods possible" (Bergman, 2008, p. 139). Each online survey paired a statement with a Likert rating scale and an additional open-ended statement and/or question. A Likert scale is an attitude rating scale and defined by Fraenkel and Wallen (2006) as "similar to rating scales in form, with words and numbers placed on a continuum. Subjects circle the word or number that best represents how they feel about the topics included in the questions or statements in the scale" (p. 127).

Each survey consisted of no more than 10 sets of statements with rating scales and open-ended statements. Participants were restricted to choose only one response for each Likert scale portion of the survey. Participants were also able to skip any Likert-scale, open-ended statements, and questions.

The researcher utilized an attitude scale from "strongly agree" to "strongly disagree" to determine the participant's perceptions regarding the iPad device in relation to each provided statement. The open-ended portion following each statement allowed

participants to provide the researcher with further detail regarding the participant's selection or provide evidence to support a selection. "Open-ended questions allow for more individualized responses, but they are sometimes difficult to interpret" (Fraenkel & Wallen, 2006, p. 403).

The researcher created the questions for face-to-face interviews with district content facilitators. Advantages of an interview are "the interviewer can clarify any questions that are obscure and also can ask the respondent to expand on answers that are particularly important or revealing" (Fraenkel & Wallen, 2006, p. 120). The time requirement of an interview is a disadvantage (Fraenkel & Wallen, 2006). The researcher limited the number of questions to reduce the length of the interview. Recorded interviews ranged in time from 11 minutes and 12 seconds to 18 minutes and 14 seconds, well below the researcher's 60-minute approximation. The district content facilitators were interviewed using questions based on the district goals for iPad instructional implementation within the classroom and his/her perception(s) of the usage of iPads and their usefulness in improving instruction; the type and extent of professional development provided around the device; and the district plan for technology. Each face-to-face interview was anticipated to take approximately 60 minutes using a pre-determined list of interview questions that were recorded and later transcribed. Conducting a personal interview, "is probably the most effective survey method for enlisting the cooperation of the respondents. Rapport can be established, questions can be clarified, unclear or incomplete answers can be followed up, and so on" (Fraenkel & Wallen, 2006, pp. 401-402).

Instrumentation

The survey prompts, open-ended questions, and interview questions (see Appendices A, B, C, and E) were created by the researcher with the intent to address hypotheses and research questions or to gather general information or perceptions regarding the use of the iPad device. RQ1, RQ2, RQ3, and RQ7 addressed the perceived usefulness of the iPad device as a classroom learning tool by classroom teachers, administrators, professional support staff, and district content facilitators, respectively. RQ4, RQ5, RQ6, and RQ8 addressed the perceived usefulness of professional development by classroom teachers, administrators, professional support staff, and district content facilitators, respectively. $H_{01,}$ $H_{02,}$ and H_{03} addressed the effects of the iPad on classroom strategies measured by survey ratings by classroom teachers, administrators, and professional support staff.

Table 2 represents the alignment with each question or prompt with the appropriate study Research Question or Hypothesis.

Table 2.

Alignment for Survey Prompts, Open-Ended Questions, and Interview Questions

Instrument	Question	Alignment
Classroom Teacher Survey	1,2,3,4,5,6,7,10	H_{01}
Classroom Teacher Survey	1a. 2a, 2b, 3a, 3b, 4a, 4b, 5a, 5b, 6a, 6b, 10a, 10b	RQ1
Classroom Teacher Survey	7a, 7b, 8a	RQ4
Classroom Teacher Survey	8, 9, 9a,	General
Administrator Survey	1,2, 3,4,5,7	H_{02}
Administrator Survey	1a, 1b, 2a, 3a, 4a, 4b, 5a,	RQ2
Administrator Survey	6a, 6b, 7a,	RQ5
Administrator Survey	6, 8, 8a	General
Professional Support Staff Survey	1,2, 3,6,7	H_{03}
Professional Support Staff Survey	1a, 1b, 2a, 3a, 3b, 6a, 7a, 7b	RQ3
Professional Support Staff Survey	4a	RQ6
Professional Support Staff Survey	4, 5, 5a	General
District Content Facilitator Interview	1, 2, 3, 4	RQ7
District Content Facilitator Interview	5	RQ8
District Content Facilitator Interview	6	General
Technology Facilitator Interview	1, 2, 3, 4	RQ7
Technology Facilitator Interview	5	RQ8
Technology Facilitator Interview	6	General

Tables 3-5 state the survey prompts and open-ended questions for the three role-specific surveys: Classroom Teacher, Administrator, and Professional Support Staff.

Table 3.

Classroom Teacher Survey Prompts and Open-Ended Questions

Question	Type
▪ I used iPad devices regularly with my students in the classroom.	Prompt
▪ One way I use the iPad device with my students	Open-ended
▪ I find it easy to use the iPad as an instructional device in the classroom.	Prompt
▪ The iPad is easiest to use when	Open-ended
▪ A problem I have encountered with using the iPad in my classroom	Open-ended
▪ The iPad is a valuable tool for improving my classroom instruction.	Prompt
▪ One of the most valuable aids to my instruction from using the iPad is	Open-ended
▪ One way the iPad could be made more valuable as an aid to my instruction is	Open-ended
▪ The iPad replaces other technology in my classroom.	Prompt
▪ One piece of technology which the iPad replaced is	Open-ended
▪ The iPad's main value as technology in my classroom is	Open-ended
▪ My students are able to use the iPad device with minimal or no training.	Prompt
▪ One way that my students have learned on their own to use the iPad device is	Open-ended
▪ My students could have used the following kind(s) of training	Open-ended
▪ My students are using the iPad device to guide their own learning.	Prompt
▪ For example, one way they show responsibility for their own learning is	Open-ended
▪ One concern I have with the iPad as a self-directed learning device is	Open-ended
▪ The training I received in using the iPad device as a classroom-learning tool was effective.	Prompt
▪ My training in use of the iPad was particularly useful in	Open-ended
▪ I could have used additional training in the area(s) of	Open-ended
▪ I have sought out information from others on their experiences with the iPad.	Prompt
▪ My best source of information was	Open-ended
▪ I am aware of the district expectations on use of the iPad in my classroom.	Prompt
▪ What does the district expect for teacher use of the iPad in the classroom?	Open-ended
▪ The iPad has caused me to change my classroom strategies and methods.	Prompt
▪ One instructional strategy that is new or I have changed is	Open-ended
▪ The iPad has not affected my classroom methods and strategies, however I find it most useful for	Open-ended

Table 4.

Administrator Survey Prompts and Open-Ended Questions

Question	Type
▪ My teachers use the iPad device regularly in the classroom with students to improve learning.	Prompt
▪ One example of teachers doing this is	Open-ended
▪ One problem teachers face with using the iPad in the classroom regularly is	Open-ended
▪ The iPad device has replaced other available technology tools in my school.	Prompt
▪ One technology tool that the iPad device has replaced is	Open-ended
▪ Teachers believe that the iPad is an effective tool to use in their classrooms.	Prompt
▪ Some of the comments from teachers are	Open-ended
▪ Students appear to be using the iPad device with little or no guidance.	Prompt
▪ An example or two of this is	Open-ended
▪ One way to increase student self-directed use of the iPad device would be	Open-ended
▪ The iPad device allows students to take responsibility for guiding their own learning.	Prompt
▪ What is an example that shows students taking responsibility for their own learning using an iPad?	Open-ended
▪ The training my teachers received in using the iPad device as an educational tool in the classroom was effective.	Prompt
▪ This is evident based upon the following observations:	Open-ended
▪ Training could have been better if it included	Open-ended
▪ I have sought out information from other principals on the use of the iPad by their teachers.	Prompt
▪ Some of the comments from my colleagues are	Open-ended
▪ My teachers and I are aware of the school district's expectations on use of the iPad in our building.	Prompt
▪ One of the expectations for the administrator's role is	Open-ended

Table 5.

Professional Support Staff Survey Prompts and Open-Ended Questions

Question	Type
▪ I use the iPad device regularly to facilitate, enhance, and improve job functions.	Prompt
▪ What is one of the most effective ways that using an iPad device facilitates, enhances, and improves your job functions?	Open-ended
▪ The iPad could be more effective if it	Open-ended
▪ The iPad device has replaced other available technology tools in my job.	Prompt
▪ One technology tool that the iPad device has replaced is	Open-ended
▪ The iPad device is easy for me to use in my job.	Prompt
▪ I find that the iPad device is easiest to use when	Open-ended
▪ One difficulty I have experienced with the use of the iPad in my job is	Open-ended
▪ I have sought out information from other sources on using the iPad in my job.	Prompt
▪ Where did you find the best source of information?	Open-ended
▪ I am aware of the district expectations on use of the iPad for my job.	Prompt
▪ What does the district expect for use of the iPad in your job?	Open-ended
▪ My daily functions have changed since I began using an iPad device for my job.	Prompt
▪ How have your daily functions changed?	Open-ended
▪ The iPad is useful to me as I assist teachers to improve their classroom instruction.	Prompt
▪ One example of my use of an iPad to support teachers in classroo instruction is	Open-ended
▪ One reason why the iPad has not been useful to me in assisting teachers to improve their classroom instruction is	Open-ended

Tables 6-7 present the District Content Facilitator Interview Questions and the Technology Facilitator Interview Questions.

Table 6.

Technology Facilitator Interview Questions

Question
▪ Now that the iPad device has been introduced into the classroom as a learning tool, what are your perceptions of its usefulness? ▪ How has the use of the iPad device affected teachers' classroom strategies and methods within the school district? ▪ Are there particular iPad functions that you perceive to be more effective for classroom use? ▪ Have you compared the iPad to other district technology tools for classroom use? What are your findings? Have teachers within the district commented on their use of technology within the district? ▪ Can you describe the type and extent of professional development provided for teacher use of the iPad device in the classroom? Has professional development had an impact on the use and effectiveness of the iPad as an instructional tool? ▪ Does the district have a broader plan for use of the iPad as an instructional device in the classroom? What is the current status of the plan?

Table 7.

District Content Facilitator Interview Questions

Question
▪ Now that the iPad device has been introduced into the classroom as a learning tool, what are your perceptions of its usefulness? ▪ How has the use of the iPad device affected classroom-teaching strategies and methods within the district as gathered from the teachers? ▪ Are there particular iPad functions that you perceive to be most effective for classroom use? ▪ Have you compared the iPad as a classroom tool with other district technology tools? What have you found? Have teachers within the district commented on their use of technology? ▪ Can you describe the type and extent of professional development provided for teacher use of the iPad device in the classrooms? Has the professional development had an impact on the use and effectiveness of the iPad as an instructional tool? ▪ Are you aware of an overall district plan for the use of classroom technology within the district? What is the status of the district plan?

Data Analysis Procedure

Prior to beginning the university IRB application for conducting research involving human subjects, the researcher gained the approval from the superintendent of the researched school district to examine the use of iPads in district classrooms. The researcher also discussed the intended project with the Assistant Superintendent of

Curriculum and Instruction and informally interviewed the district content facilitator regarding the iPad pilot in 2011 to gather information for the IRB application and to secure permission to utilize the district's professional Survey Monkey account to administer online questionnaires. The researcher completed the university's IRB application which included research questions and hypothesis statements; background of the study; researcher created survey instruments in the form of questionnaires (see Appendices A, B, and C), attitude rating scales and interview questions (see Appendix E); and signed letters of permission to conduct research in the school district. The researcher obtained approval from the university's IRB in May 2012.

The study school district approved the purchase of iPad devices for all certified staff in May 2012, shortly after the researcher received IRB approval. Due to the potential to administer survey instruments to a larger population, the researcher decided to wait to conduct research until later in the 2012-2013 school year. In March 2013, the researcher prepared the three online role-specific surveys utilizing the professional Survey Monkey account of the district.

The researcher emailed the request for participation to the researched population during the last week of March 2013. The email contained a recruitment letter, informed consent, and contact information for the researcher and the researcher's university. Individuals replied to the researcher indicating their interest to participate in the study. The researcher then replied to each email received and provided the option for participants to print, sign and return to the researcher the attached signed consent form or receive a printed copy of the consent form, with a return envelope provided to the researcher. Once the researcher received the signed consent forms, the participants were

emailed one of the three online survey instrument links based upon the participant's district position. The researcher organized participant information in an Excel spreadsheet to track the role-specific survey link sent to participants. Once the researcher received the signed consent form from the participant, the researcher signed, made a copy and sent the copy of the signed consent to the participant. The researcher had no knowledge of the identity of potential participants who completed the online survey link, as no identifying information was collected during the survey.

The researcher contacted district content facilitators and the assistant administrator of teaching and learning to arrange an interview dependent upon the participant's availability. The first interview occurred during the third week in May. The researcher sent a reminder regarding the scheduled interview the day prior as confirmation, and provided a copy of the interview questions to research participants (see Appendix E). At the time of the study, three eligible participants had the title of District Content Facilitator. For the purpose of this study, the researcher defined one of the District Content Facilitators as a District Technology Facilitator due to role-specific responsibilities related to the iPad pilot and iPad scout. Each interviewee was asked six similar questions with slight variances between the district content facilitators and the district technology facilitator.

Due to a low-response rate, the researcher resent the request for participation in the online survey during the second week of May, 2013, and continued to follow the procedures outlined with the first request. The researcher sent reminders to participants to complete the survey or return the signed consent form. Nulty (2008) noted, "In general, online surveys are much less likely to achieve response rates as high as surveys

administered on paper—despite the use of various practices to lift them" (p. 302). Unfortunately, the second try resulted in another low-response rate, therefore the researcher emailed the district Superintendent and the Assistant Superintendent of Curriculum and Instruction in June, 2013, and received permission to resend the survey a third time. The final request resulted in additional responses, however the rate of return remained low. Survey link access remained open until the second week of July, 2013. Online survey collection provided an overall 11.36% (n=55) response rate from the research population (see Table 8).

Table 8.

Online Survey Response Rate

	Classroom Teachers	Administrators	Professional Support Staff
Research Population	422	18	44
Participants	41	1	13
Response Rate	9.71%	5.56%	29.55%

The researcher transcribed each personal interview recorded on the researcher's district issued iPad with the App "Super Note", and sent the interviewee a copy of the transcription for verification. The researcher downloaded the recorded interviews onto her personal laptop. The researcher downloaded the data from the three surveys from the district's professional Survey Monkey account. Simultaneous data analysis occurred with interview transcriptions and online survey data.

The researcher reviewed secondary data provided by the district from the iPad pilot exit survey administered to the district Technology Leadership Group (TLG) in 2011 by the district content facilitator of the pilot. The survey consisted of questions to assess the teachers' experiences with and perceptions of the usefulness of the iPad device

as an instructional tool. The TLG consisted of 48 members, with 28 members completing the iPad exit survey, resulting in a 58.33% response rate. Responses indicated 39.3% of participants specified a workload shift of 50% or more from the laptop to the iPad. Participants also noted daily, or several times a day, (64.3%) for iPad usage in the classroom; and daily, or several times a day, (67.9%) for work purposes outside the school day. Participant responses noted the access of Safari App (82.19%) daily, or several times a day. Participant responses regarding tasks executed daily, and several times a day, noted gradebook (46.5%), email (85.7%), and web browsing (81.5%) as tasks most frequently completed. Participants indicated (78.6%) the iPad as relevant or very relevant to the technology future of the district. Responses indicated 75% support/strongly support one-to-one implementation for teachers-to-device and 57.1% support/strongly support for one-to-one implementation for students-to-device.

The researcher received IRB approval to utilize additional secondary data from the Moodle site online forum, available to the TLG during the 2011 iPad pilot. This site served as an avenue for TLG participants to post questions, their perceptions, and suggestions regarding the iPad device and its functions. The researcher did not access the data or utilize the Moodle secondary data. The researcher believed the Moodle secondary data to be relevant at the time of the IRB request, however due to the age of the data the researcher believed it to not be relevant anymore as the study school district moved to one-to-one teacher implementation and to one-to-one student implementation. The researcher acknowledged the potential for the Moodle secondary data to be overwhelming to process due to the quantity and acknowledged the need to complete the project before more technological change occurred in the study school district.

Data Analysis

This research study utilized a mixed methods approach including both qualitative and quantitative data to measure the perceptions of administrators, teachers and professional support staff. "Educational research increasingly is and should be a mixture of quantitative and qualitative approaches" (Fraenkel & Wallen, 2006, p. 430). Data collection included a triangulation of both qualitative and quantitative data collected, compared and utilized to support the findings (Fraenkel & Wallen, 2006).

Quantitative data was collected from participants' rankings of their responses to Likert scales for each of the statements contained in the role-specific online surveys. All responses were tallied based on combining "agree" and "strongly agree" as positive responses, and "disagree" and "strongly disagree" as negative responses. A *z*-test for difference in proportions was applied to Null Hypothesis # 1 to check for potential statistical differences between the percentage of positive responses and the percentage of negative responses, with regard to effects on classroom strategies. Due to small sample size, a Chi Square for homogeneity in proportion was applied to the Null Hypothesis # 3 to check for differences in positive and negative perception of effect on teacher choice of classroom strategies and methods. The rejection or non-rejection of this hypothesis was validated through additional application of the *z*-test for difference in proportion to the same data. The researcher organized quantitative data for the *z*-test and Chi Square in an excel spreadsheet. Due to a low response rate for the administrator survey, the researcher was unable to apply statistical testing to Null Hypothesis # 2. Null Hypothesis # 2 will only be discussed in terms of observable data.

The researcher received IRB approval to tally responses to the statements contained in the iPad pilot exit survey in 2011 combining “agree” with “strongly agree” to verify a positive response to the pilot training program. The researcher also received IRB approval to tally responses to the statements contained in the 2011 iPad pilot exit survey to determine a ranking of the responses based on combining “disagree” with “strongly disagree” to verify a negative response to the pilot training program. The researcher intended to perform a *z*-test for difference in proportions to measure a possible statistical difference between the percentage of positive responses and the percentage of negative responses to survey statements. However, due to the low number of participants and structure of the iPad pilot exit survey, the researcher was unable to conduct a *z*-test for difference in proportions and chose to present the data descriptively in this chapter instead. The researcher also determined the iPad pilot exit survey in 2011 did not directly relate to current use in the classroom therefore the data was not formally analyzed. A descriptive summary of pertinent data follows in Tables 9, 10, and 11.

Descriptive Results of iPad Pilot Exit Survey

Tables 9-11 are a partial representation of the iPad pilot exit survey with a portion of the results displayed and only descriptive data displayed.

Table 9.

How Regularly did you Access the Following Apps on Your iPad?

	several times a day	daily	weekly	infrequently	not at all
Pages	0.0%	7.4%	22.2%	44.4%	25.9%
Keynote	0.0%	0.0%	14.3%	32.1%	53.6%
Numbers	0.0%	0.0%	10.7%	28.6%	60.7%
iBooks	0.0%	21.4%	28.6%	25.0%	25.0%
Safari	57.1%	25.0%	17.9%	0.0%	0.0%

Note: n = 28; Exit Survey Question # 4.

Table 10.

How Regularly did you Carry out the Following Tasks on Your iPad?

	several times a day	daily	weekly	infrequently	not at all
GradeBook	28.6%	17.9%	17.9%	21.4%	14.3%
PIV	4.2%	0.0%	0.0%	20.8%	75.0%
MLP	0.0%	7.7%	7.7%	46.2%	38.5%
Safari Montage	3.8%	3.8%	7.7%	30.8%	53.8%
App Store exploring	10.7%	32.1%	50.0%	7.1%	0.0%
Email	60.7%	25.0%	14.3%	0.0%	0.0%
Web browsing	59.3%	22.2%	18.5%	0.0%	0.0%
Video viewing	18.5%	11.1%	33.3%	22.2%	14.8%
eBook reading	7.1%	17.9%	25.0%	28.6%	21.4%
Note Taking	11.1%	11.1%	44.4%	14.8%	18.5%
Document creation	3.6%	10.7%	10.7%	50.0%	25.0%
Presentation creation	0.0%	0.0%	14.3%	35.7%	50.0%

Note: n = 28; Exit Survey Question # 6.

Table 11.

How Much Support Would you Offer the Following Hypothetical iPad Initiatives?

	Strongly support	Support	Indifferent	Unnecessary	Very unnecessary	Rating Average
PD support	48.1%	40.7%	7.4%	3.7%	0.0%	4.33
Classroom sets	55.6%	25.9%	14.8%	3.7%	0.0%	4.33
1-1 for teachers	50.0%	25.0%	14.3%	7.1%	3.6%	4.11
1-1 for students	25.0%	32.1%	10.7%	25.0%	7.1%	3.43

Note: n = 28; Exit Survey Question # 9.

Qualitative data collected from the research participants including: open-ended questions contained in the three role-specific online surveys and responses to personal interviews with the district's content facilitators were coded to identify any emerging themes. Maxwell (2005) stated the goal of data coding in qualitative research is to "rearrange the [responses] into categories that facilitate [a] comparison between things in the same category and that aid in the development of theoretical concepts" (p. 96).

Summary

The researcher completed a mixed methods study to measure the perceptions of administrators, teachers, and professional support staff on the use of the iPad for instruction and daily educational activities. Data collection occurred from March, 2013-July, 2013. Survey Instruments included a Likert-scale survey, open-ended statements and personal interview. Survey data collected online was secured on the researched districts protected Survey Monkey account. Recorded interviews were housed on the researcher's district issued, passcode locked iPad device, and on the researcher's personal password protected MacBook Pro laptop device, with backups located on the researcher's personal password protected external hard drive.

The purpose of Chapter Three was to explain the methodology of this mixed methods study, provide background of the researched school district, describe the sample, and explain the data collection instruments and data analyses. In the next chapter, the qualitative and quantitative results will be presented.

Chapter Four: Results

The purpose of this study was to measure the perceptions of administrators, teachers, and professional support staff on the use of the iPad for instruction and daily educational activities. All research participants were from one Midwest school district. At the time of this study, the researched school district was comprised of 392 teachers, 318 support staff, 58 Special School District Staff, and 26 administrators in 2012-2013 (Key Facts 2012-2013, 2012). For the purpose of this research, the researcher organized eligible participants into three groups: classroom teachers, administrators, and professional support staff. Redistribution of staff, according to the roles specified by the researcher, are outlined in Table 12. The researcher utilized a mixed methods approach with role-specific online surveys, containing two types of questions, Likert scale and open-ended; and face-to-face interviews. The researcher applied descriptive and statistical analysis to the quantitative data collected from the three role-specific online surveys. The researcher coded and organized themes from qualitative sources of open-ended questions and face-to-face interviews. This chapter will present the research questions and hypothesis statements, outlined in the previous chapter, with the quantitative and qualitative data.

Table 12.

Population and Research Population Comparison

	Classroom Teachers	Administrators	Professional Support Staff
Population	392	26	*
Research Population	422	18	44

Note. Population numbers do not account for special school district employees or district individuals not categorized at teachers.

Data Analysis

Participant responses to the role-specific online surveys yielded quantitative and qualitative responses. The researcher utilized an online survey site, Survey Monkey, to administer and organize survey data collection. Online survey collection provided an overall 11.36% (n=55) response rate from the research population. Interviews were scheduled and conducted from May 2013 to July 2013. Interview participation response rate yielded 75% (n=3). Recorded interview times ranged from 11 minutes and 12 seconds to 18 minutes and 14 seconds. The researcher transcribed the recorded interview and provided each participant a copy of the transcription for approval. Results of quantitative and qualitative data in relation to hypotheses statements and research questions were organized and presented by the researcher defined role-specific participant groups.

Table 12.

Population and Research Population Comparison

	Classroom Teachers	Administrators	Professional Support Staff
Population	392	26	*
Research Population	422	18	44

Note. Population numbers do not account for special school district employees or district individuals not categorized at teachers.

District population does not categorize individuals according to their role, as the researcher did to create the professional support staff group. For these two reasons, the research population for the classroom teachers was larger than the population. * is denoted due to the researcher categorized individuals as professional support staff where as the district may have counted those individuals in the classroom teacher population or not accounted for them based on their role.

Classroom Teachers

For the purpose of this study the researcher defined classroom teachers as individuals who were in the regular routine of teaching a classroom of students. The teachers in the research population were elementary teachers, middle and secondary grade specific teachers, content specific teachers, special area teachers, instructional specialists, teachers of gifted students, and special school district teachers. For the purpose of this research, the group defined as classroom teachers had a population of 422 and yielded a participant response rate of 9.71%. Classroom teacher survey questions (see Appendix A) addressed Null Hypothesis 1 (H_{01}), Research Question 1 (RQ1) and Research Question 4 (RQ4).

H_{01}: Classroom teachers who employ the iPad device as a classroom-learning tool will not perceive positive effects on their classroom strategies and methods as measured by their ratings on a survey containing a Likert-type scale.

Classroom teacher survey statement 1. *I used iPad devices regularly with my students in the classroom.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value 2.210 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate hypothesis. There was a significant difference; the proportion of disagreement with this survey prompt was significantly higher than the proportion of agreement.

Classroom teacher survey statement 2. *I find it easy to use the iPad as an instructional device in the classroom.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of

negative perception. The test value -2.210 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate hypothesis. There was a significant difference; the proportion of agreement with this survey prompt was significantly higher than the proportion of disagreement.

Classroom teacher survey statement 3. *The iPad is a valuable tool for improving my classroom instruction.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value -5.352 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate hypothesis. There was a significant difference; the proportion of agreement with this survey prompt was significantly higher than the proportion of disagreement.

Classroom teacher survey statement 4. *The iPad replaces other technology in my classroom.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value 2.141 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate hypothesis. There was a significant difference; the proportion of disagreement with this survey prompt was significantly higher than the proportion of agreement.

Classroom teacher survey statement 5. *My students are able to use the iPad device with minimal or no training.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value -5.212 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate

hypothesis. There was a significant difference; the proportion of agreement with this survey prompt was significantly higher than the proportion of disagreement.

Classroom teacher survey statement 6. *My students are using the iPad device to guide their own learning.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value 0.485 was compared to the critical values +1.96 and -1.96. There was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the proportion of disagreement with this survey prompt was higher than the proportion of agreement; however, the difference was not statistically significant.

Classroom teacher survey statement 7. *The training I received in using the iPad device as a classroom-learning tool was effective.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value 0.485 was compared to the critical values +1.96 and -1.96. There was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the proportion of disagreement with this survey prompt was higher than the proportion of agreement; however the difference was not statistically significant.

Classroom teacher survey statement 8. *I have sought out information from others on their experiences with the iPad.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value -8.602 was compared to the critical values +1.96 and -1.96. The researcher rejected the null hypothesis, and supported the alternate

hypothesis. There was a significant difference; the proportion of agreement with this question survey prompt was significantly higher than the proportion of disagreement; specifically the entire sample was in agreement with the survey prompt.

Classroom teacher survey statement 9. *I am aware of the district expectations on use of the iPad in my classroom.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value 0 was compared to the critical values +1.96 and -1.96. There was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the proportion of disagreement with this survey prompt was the same as the proportion of agreement.

Classroom teacher survey statement 10. *The iPad has caused me to change my classroom strategies and methods.* The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value -0.235 was compared to the critical values +1.96 and -1.96. There was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the proportion of agreement with this question survey prompt was higher than the proportion of disagreement; however the difference was not statistically significant.

Summary of classroom teacher survey statements. After totaling all classroom teacher responses the researcher organized and averaged the total percentage for agreement and averaged the total percentage for disagreement. The researcher applied a *z*-test for difference in proportion in comparing the percentage of positive perception to the percentage of negative perception. The test value -0.774 was compared to the critical

values +1.96 and -1.96. There was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the proportion of agreement with this survey prompt was higher than the proportion of disagreement; however the difference was not statistically significant.

Classroom teacher qualitative data. The classroom teacher survey contained 17 open-ended statements (see Appendix A). The researcher transferred responses into an Excel spreadsheet, coded and identified seven themes from the open-ended responses to address Research Question 1 and Research Question 4. The themes were: Applications (Apps); access; teacher tool; student tool; device functions; iPad replacing technology; and professional development. Additional outlier themes emerged and are discussed in relationship to specific research questions.

Research Question 1. *How do classroom teachers in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?* The researcher transferred responses into an Excel spreadsheet, coded and identified the emergent themes from open-ended statements to address Research Question 1.

Applications (Apps). Participants indicated apps, and named specific apps, as one way they used the iPad with students. One respondent noted, "I use speech apps with speech impaired students. They provide word lists of specific sounds in specific positions in words." Another respondent cited the use of a specific app for a project as an "iMovie for commercials". Apps emerged as a theme indicating when the iPad was easiest to use. Participants stated the iPad was easiest to use when "We have the apps that we need"; "Ap[p]s are appropriate and require few work arounds"; "I have the same apps the students do and we can mirror what we are doing on our ActivBoard"; and

"The app is already loaded and available. Then, I don't have to find one for the project first before I can get it installed and plan the lesson."

Participants cited apps as a way to enhance a lesson and as a way to make the iPad more valuable to instruction. "Honestly, the most valuable piece of the iPads to my instruction currently is the excitement they provide for the students. They love [with emphasis] using them. The variety of applications that fit within our curriculum is great as well." Participant responses indicated iPad apps could be more valuable to instruction with "Better apps" and "Having more apps made available to students more efficiently." A handful of responses noted limitations to free apps with the desire to be able to also purchase apps. One respondent noted, "being able to use more apps that cost money" was as a way the iPad could be more valuable to instruction. Several responses indicated the need for apps to connect with content or curriculum. Responses included "more apps were available through the district, purchased based on curriculum"; "if apps were developed for specific content knowledge in accordance with curricula"; "a list of tried and true apps to go with our curriculum" and "I think it would be great to have a bank of applications that work for each curriculum area/unit that we can pull from district wide."

Participants also noted problems associated with apps such as "The ap[p]s are limited in what they can do or confusing for the non tech kids." Participants noted problems encountered with apps such as getting the apps on all devices and the cost associated with paid apps, "Apps are a pain to get on all the iPads. And they are expensive!!!" Responses also indicated the need for training around the usage of apps in the classroom. One respondent indicated a training need on "appropriate/viable Apps to use with the kids."

Access. Responses noted the use of the iPad to access content and the Internet. One participant stated, "The quick individual access to resources and [I]nternet information, and the ability to access new education experiences to reinforce newly acquired information" as the main value of the iPad for the classroom. Other participants noted the value of the iPad as a research tool in the classroom. Responses included, "Access to a lot of resources" and "Linking students up to another source for reference, learning proper research methods, etc."

Responses also indicated issues with accessing content online due to filtering, Wifi connections, or "some technology glitch." One response indicated the need to address filtering and the different level of needs at the high school, middle school and elementary school levels, while another respondent noted, "The many filters the school has on the wi-fi makes it difficult to access the ap[p]s that would provide the most for my students."

Teacher tool. Participants cited use of the device for teacher daily functions such as communication, attendance, lesson planning, and email. Participant responses included "I take attendance"; "I don't really use it for instruction purposes. I may search for lesson ideas on the iPad"; and "Recording attendance, notes and playing music." Another participant noted a value of the iPad as "having a flexible device available all of the time that can be used in so many ways." One teacher function noted was an application to assessment. One participant indicated assessment "using the video option." While other participant responses noted instructional value from the iPad as "feedback to students and ongoing assessment using certain apps" and "Being able to record students doing a task to show them."

Participants also noted the use of the device to document and create a digital record of student work and classroom happenings. One participant cited the iPad as "handy for making pictures and videos of my students and their work" while another respondent indicated "taking more pictures/videos of class activities and great learning moments and sharing them with students and parents. Keep[ing] digital records of student conferences." Respondents also indicated no change to instructional practices.

Student tool. Participants noted student learning with the iPad in various forms from one-on-one with the teacher; one-on-one with the iPad; small group; and learning centers. Participants cited the iPad device as easiest to use as a tool for students when "every student has one"; "when working one on one with a student'; "in a small group discussion"; and "they are all doing the same site or app." Respondents noted the iPad provided opportunities for individualized instruction. "It provides individual instructions to each student and allows choice"; "It gives the students individual instruction on a particular technique"; and "[the] [a]bility of students to move through tasks at [their] own pace or for tasks to be more readily differentiated for students." One participant indicated a change to their instruction as "Allowing the kids to present material in whatever way works best for them with technology. That was not always possible in everyday instruction." Participants noted the need for more devices or noticed the lack of devices available. Responses indicated, "if all of my students had regular access to their own iPads"; "if there were more iPads to go around"; and "Multiple iPads within the classroom being available for further student use" as ways for the iPad to be more valuable for instruction.

Numerous responses regarding the value of the iPad on instruction indicated the iPad provided student engagement and motivation. Responses included "kids love technology"; "motivates kids"; "student motivation"; and "student engagement." Additional respondents noted, "It increased student engagement and allowed students to use more ways to show their work" and "how engaged and excited the students [were] when using the iPad"; "Student engagement increases when using iPads in the classroom…The technology skills that are taught while using iPads will provide the 21st century skills that students need to compete in a globalized job market."

Students have become teachers of the teacher and other students. One respondent stated a value of the iPad as "being able to share technology with the students and having them teach me things to be used in the classroom." Another respondent stated students already knew how to use the iPad and "They seriously come to me and teach me things!"

The iPad was easy to use when students were familiar with the device as noted by several participants. Responses included, "The students already know what they are doing or looking for without much teaching"; "The students have had time to explore and already understand the basic functions of the devi[c]e." Participants also commented on the readiness of the learner contributed to the ease of use. "The students are ready to be learners themselves [and] listen and think."

Participants believed students learned on their own to use the iPad device from a variety of sources. Several participants noted prior device knowledge as the way students have learned to use the iPad on their own. Responses included, "some students are quite savvy with technology while others lack exposure to technology other than at school. Even for students, who appear knowledgeable, there are sometimes gaps or holes in what

they know"; "Many have iPhones. The concept is the same"; and "they have handheld phones that are also app-driven." Several other participants cited student practices as how students have learned on their own. Responses stated; "Allowing them to experiment and see what works best"; "Having time to play around with them"; and "through trial and error and consulting with each other." A few participants cited home as student's source of learning. "They either have them at home or have phones" and "iPads are prevalent in many homes and smartphones are also very accessible to our students it seems." Other participants noted the knowledge of others as how students have learned to use the iPad. Responses indicated students learned "by asking friends for help" and "from other students who have iPad knowledge."

Participants noted students were able to show responsibility for their learning. Responses noted that using an iPad shifted the responsibility for learning by locating information sources. One respondent stated, "My students were pretty good at finding more places for information on the web." Another respondent noted, "if they have a question that we can't answer they will often go to the iPad and use it as reference material." Participants cited students initiating learning "by taking the lead and wanting to show how they got to an answer." Other respondents viewed students showing responsibility by appropriate use of the device by "selecting appropriate apps" and "Most students follow my direction and use them for uses I've approved." Additional responses indicated student documentation of work with the device by "using the iPad to record their assignments"; and "their photo documentation shares their content understanding of instruction provided."

Participant responses indicated students could have benefited from additional training with the iPad. Several participants noted general functions of the device as area topic for student training. Respondents specifically noted students needed "the basics on the apps that were provided to them"; "strategies for saving the battery and organizing their notes and work"; and "basic finger maneuvering." A few participants noted the need for additional training with apps. One respondent stated, "Useful application hunting to find apps that they will use purposefully." Other responses noted researching skills; Internet safety; and procedures and expectations as areas for training. Several participants indicated students did not need additional training or did not know what training students needed. Responses indicated "Not really anything; they pretty much are tech savvy"; "I haven't used them enough to know the answer to this"; and "not sure at this time."

The iPad as a self-directed learning device presented concerns for participants. The majority of responses addressed inappropriate use and appropriate use. Responses included, "ensuring each child's safety and appropriately utilizing the device in a secure fashion"; "students stumbling across inappropriate content"; and "it can be hard to monitor inappropriate use." Other concerns regarding student use was the device as a distraction. Responses indicated "students playing games when they should be following along in class" and "many students are distracted because games are easier to access and free compared to the learning tools."

Device functions. Participants noted overall ease of use as positive as well as a variety of specific tasks or functions of the iPad. "The iPad is so simple to use. Students are familiar with their own iPads, iPods, and iPhones so they quickly pick up the school

iPads and can use them efficiently." Device functions were cited as valuable to instruction. One response indicated, "Gives student easy access to books and labs without having to carry around all the papers, etc." The mobile and portable aspect of the device is commonly associated as a positive feature. "It's mobility. I imagine that it will replace both desktop and laptop computers. It'll be important that we have a strong system for mirroring iPads to the [A]ctivboard for demonstration"; "They are small and the students can keep them on their desks"; "mobility of recording grades as I walk around from student to student. I can also check my email on the go"; "It is smaller and potentially easier to use than a laptop" and "convenient portable technology." Other responses regarding portability related to "use at home. Convenient portable technology."

The reflection tool and camera tool were cited numerous times as useful functions of the device. One participant noted these tools "for documenting classroom topics/materials, movie maker for classroom productions." Other participants stated, "[students] could also take photos of things written on the board, etc. to store for later reference" and "I use video and photos much more to personalize instruction and capture students' work." The reflection tool enables the image from the iPad to show on a larger screen such as an interactive whiteboard. Participants noted the reflection tool as easy to use on the iPad and stated "Using the Reflection tool to show students work"; "It works quickly in the mirroring stage of what I am doing and I simply want the students to see something engaging and active." Other responses included: "The ability to project the i[P]ad up on my screen for the whole class to see. I can go through an app with students who do not have i[P]ads or who may be distracted to 'surf' around the app and not follow

along with my teaching"; and "sharing more student work by reflecting to ActivBoard. This saves time (rather than have student reproduce work on board) and allows students to share their thinking with others." A few responses indicated issues in the classroom with the reflection tool and stated, "regular problems with the reflection app" and "when the mirroring feature does not keep up with what I am seeing on my iPad."

Participants noted the importance of devices being charged and ready and noted concerns with the iPad device such as slow downloads, word processing, and a limited number of devices available. Responses included, "iPad is not charged, crashing, and very slow [with emphasis] downloads of apps"; "The iPads are difficult to do word processing on"; and "It is difficult to take turns and share one iPad for a classroom." Participants also indicated they needed additional training in the areas of backing up iPad and iPad basics. One response indicated, "Backing up data and making sure I don't lose all that I have worked on with the iPad." Another participant wanted more tips and tricks of the device. "I would like to know more little tricks/hints to using it with more ease. For example, I had it for a while before I knew you could change screens by swiping five fingers across my screen." Another participant stated a need for training in, "Basic manipulation of the iPad. I taught myself by getting an iPhone."

iPad replacing technology. Some participant responses indicated the iPad did not replace any existing technology. "i[P]ads really don't replace, but they enhance"; "we continue to use the laptops a great deal more"; "The iPad did not replace technology in my classroom. I try to use many different technologies"; and "I do not think the iPad can completely replace laptops. The keyboard functions are not easy to use." Other responses indicated the iPad replaced cameras, flip cameras or video cameras, a laptop or desktop

computer, stereo or tape recorder. Responses included, “We had flipcams that we used for video purposes in our classrooms, which was so cool...until we got our iPads. They are just so much easier to use and already work with our software”; “Flip Camera. But I couldn’t live without laptops!”; “We use iPads in place of laptop computers unless we are word processing.” One participant response indicated less copying and printing due to the iPad. “I am using the copy machine a lot less! I am using the printer a lot less!” Other participant responses indicated replacement of an overhead projector, any research tool, books, and DVDs. One response questioned the use of the iPad device in general. “Why is the use of an iPad better than other tools we have available? I love my iPad, don't get me wrong, but my students spend most of their day looking at a screen. Whether it's the iPad, the Activboard, their cell phones, or computers, I worry about losing active learning techniques.” Some participants noted functions the iPad replaced that had previously been completed by other technologies or non-digital functions. One participant noted they believe the district expectation of the iPad was to replace “virtually every technology in my classroom.”

Outlier themes. Additional themes emerged regarding the research questions addressed by a few responses. The researcher acknowledged the outlier themes, even though they did not fit with the majority of responses, as relevant. Time emerged as a secondary theme regarding apps. Participants stated “It just takes time to find the ap[p] that fits the assignment” and “I wish I had more time to play with it, find apps, and plan lessons around using it.” Additional responses regarding time and the iPad state it is easiest to use when, ”I have the time to explore new ideas and apps and have a great plan

in place"; "we have the appropriate amount of time"; and "I want to spend more time with it and hopefully have worked out the kinds to be able to use it as a major tool."

One respondent stated, "I think it's more of a novelty. There isn't anything on the iPad that I couldn't do in another way." Other respondents commented about use of the device for fun or free play. Responses noted, "Right now they are used mainly as a fun activity/culminating event for a unit of study" and "a teacher must [with emphasis] give free play time on the i[P]ad the last 10 minutes of class."

Only two responses throughout the survey referenced 21st century skills. One response noted the participant's perception regarding the study districts expectations for the iPad, "To enhance student-directed learning, access to technology and new opportunities to manage 21st century learning experiences."

Research Question 4. *How do classroom teachers perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?* The researcher transferred responses into an Excel spreadsheet, coded and identified the emergent themes from open-ended statements to address Research Question 4.

Professional Development. Participant responses addressed the training received for the iPad device. Several responses indicated participants perceived the training as a basic introduction to the device. Some responses included, "getting to know the basics"; "introducing me to the iPad. I had no prior experience"; and "The basic training was a good start. I think that we could use more." Other responses indicated participants received no formal or useful training. Responses included, "It was not useful. I did not receive any [with emphasis] training"; "Other than a 2 hour orientation to the iPad I had

last summer when the device was assigned to me, I have had no formal training ... other than what I've gleaned myself from other teachers or from reading online"; "I feel like I knew pretty much everything already that was taught in training."

An overwhelming majority of participants noted their best source of information regarding the iPad was other teachers or district technology personnel. Participants noted sources of information as "a teacher on my team who is a 'Scout' leader"; "Conversations with colleagues and students"; and "We have an amazing team at our school that has assisted tremendously in supporting my learning." One participant noted a helpful source could be, "If someone who is already using the iPad was my mentor and could lead my way through it." A few participants indicated students as a source of information. "I sent my students home for the week-end and then had them share when they returned and it was amazing what they taught me." Other participants relied on their own knowledge. Responses included, "I think it was just having one in my hand and figuring things out on my own" and "I felt like I didn't need a lot of training because I already personally had an iPhone and they're so similar."

Participant responses noted the need for training to use devices with students. Participants indicated, "I haven't had formal training or PD in using the iPad with students"; "I haven't been trained on various ways that [i]Pads are beneficial for students"; "I don't feel like we got useful training when we first received them on using them with students. It was so new, so I don't necessarily feel like it was anyone's fault, more that we received them quickly and received training as we went along." Other participants indicated the need for training on using a class set of iPads. "Lack of training in ways to utilize a class set"; "How I can use this in my classroom with each

student having their own iPad, besides using it for note taking"; "I feel I was taught by the district how to set up the i[P]ad with my class, but using the i[P]ad and creating lessons with the i[P]ad is overwhelming. There is not additional time to explore unless you do it at home." One participant noted the need for "More teacher training on how to incorporate into daily use." Another participant stated, "I would also prefer after-school professional development sessions to assist in learning further uses of the tool." A few responses indicated the need for collaboration. One respondent stated, "I am always interested in hearing how other teachers are using the device so that I can get inspiration for my own classroom." One respondent indicated no additional training needed and "thought my training was sufficient for what I needed," while other participants indicated the need for training in all areas; and yet another response indicated "all areas. Instructional techniques, useful apps, data collection, etc."

Participant responses noted the need for iPad training regarding content specific or curriculum specific use of the device. Respondents stated, "What apps are available and how to find quality content for curriculum"; "specific for my content area"; "utilizing i[P]ads with students-what apps are best for each subject, age, etc."; and "I think it would be great to have a database of sites that teachers have used around the district, and how they have used them to align with our curriculum."

Administrators

The researcher defined administrators as principals and assistant principals of elementary school, middle school, high school or alternative schools. This research population included 18 participants**.** Unfortunately, the researcher received only one

request to participate in this study out of the original number of 18 therefore no statistical analysis was applied.

Professional Support Staff

Professional support staff individuals were defined as individuals not in the regular routine of teaching a class of students. For the purpose of this study, these individuals held the following roles: librarians, counselors, educational support counselors, school psychologists, and some special school district employees not in the regular routine of teaching a class of students. The group defined as professional support staff had a population of 44 and yielded a participant response rate of 29.54%. The Professional Support Staff Survey (see Appendix C) addressed Null Hypothesis 3 (H_{O3})**,** Research Question 3 (RQ3) and Research Question 6 (RQ6).

H_{O3}: Professional support staff who employ the iPad device, as a learning tool will not perceive positive effects on the strategies and methods they use to support classroom instruction as measured by their ratings on a survey containing a Likert-type scale.

The researcher applied a Chi Square for homogeneity to the data and compared the test value 233.52 to the critical value 14.067. The researcher rejected the null hypothesis, and supported the alternate hypothesis. Therefore, there was a significant difference between positive (62.50%) and negative (24.31%) survey prompts. The proportion of positive response was significantly greater than the proportion of negative response. The researcher also conducted the stronger *z*-test for difference in proportion using the same data. Comparison of the test value -1.96448 to the critical values +1.96 and -1.96 indicated there was not a significant difference. The researcher did not reject the null hypothesis, and did not support the alternate hypothesis. Observably, the

proportion of agreement with survey prompts was higher than the proportion of disagreement; however, the difference was not statistically significant. The data supported the rejection of the null hypothesis, which yielded the same result as the Chi Square Test for Homogeneity.

Professional support staff qualitative data. The professional support staff survey contained 10 open-ended statements (see Appendix C). The researcher transferred responses to an Excel spreadsheet, coded and identified six emergent themes from the open-ended responses to address Research Question 3 and Research Question 6. The themes are: apps; access; professional support staff tool; device functions; iPad replacing technology; and professional development. Several themes to address Research Question 3 and Research Question 6 overlapped with classroom teacher themes used to address Research Question 1 and Research Question 4.

Research Question 3. *How do professional support staff in the study school district perceive the usefulness of the iPad as a classroom-learning tool?* The researcher transferred responses into an Excel spreadsheet, coded and identified the emergent themes from open-ended statements to address Research Question 3.

Apps. The theme of iPad apps appeared throughout responses in the professional support staff survey. Responses indicated, “Many of my lessons/demonstrations come from APPS on the iPad” and “Use of educational apps to enhance learning and engage students.” Participants expressed the need for specific apps, paid apps, as well as time to look for apps. Responses included, “had more free, fun apps designed to address social skills deficits” and “We are learning from one another as we explore good APPS.” Some participants noted specific apps or educational apps as a way to support teachers. One

response stated, “by modeling book-related apps in the library. Many teachers have asked me for the names of apps I have used.”

Access. Access was cited by respondents regarding difficulties experienced with the iPad stating “Inability to access programs that are on my desktop computer” and “Not having WiFi available or access to Internet.” Specific functions, such as the inability to use Flash, or computer applications were also noted with statements “had flash on it so that videos and read-aloud features would work on it.” One participant noted, “The iPad cannot access all the features of programs we use for research.” While another participant stated, “I simply prefer to use the laptop for the majority of my work functions because it’s easier to type on and I have easy access to the many documents saved on my hard drive.”

Professional support staff tool. Respondents found the iPad easiest to use in meetings and for scheduling while a few specified the task of note taking at meetings easier with the iPad. One respondent indicated, “I have a keyboard connected to it that also props it up. It is just as easy as and more convenient than a laptop to use for note taking at meetings.” An overwhelming majority stated their daily functions have not changed with the iPad device. Respondents commented, “I feel as if I behave the same in terms of daily functions” and “My daily functions have mostly remained the same.” The theme of replacing old functions with the iPad was evidenced in a handful of responses. The majority of responses aligned with the following answer to the survey question: *One example of my use of an iPad to support teachers in classroom instruction is,* did not apply to their role. In response to why the iPad has not been useful to support teachers, the majority of responses noted a lack of knowledge on part of the professional support

person. Responses included, “I am not sure how to do this” and “I am not aware of many programs available.” Responses also indicated the iPad device replaced prior tasks or functions such as becoming a mobile card catalog, or replacing a paper calendar.

Device functions. The desire for the device to perform specific functions was noted by respondents. Limitations of the device cited were the keyboard, printing capabilities, and lack of specific apps such as Microsoft Word, while the battery life and compact size were noted as a positive. Responses included, “I could print from it freely” and “it was easier to use the keyboard to type.” However, one respondent noted, “It is always easy to use, no complaints.” The mobility and portability were commonly cited as a positive. A few respondents noted, “The size and ease of transport is the best feature” and “It is portable, light and small enough to fit into a purse.”

iPad replacing technology. The majority of the responses focused on the iPad being a replacement for the laptop and desktop computers. Responses regarding technology that the iPad had replaced included, “Stand alone computer” and “I use the laptops way less with the [i]Pad.” Participants also noted iPad functions and tools replaced video recorders, cameras, and handheld devices such as the palm pilot and PDA and document cameras. Responses included, “the iPad effectively does the work of a document camera for A LOT cheaper!”; “it replaced the palm pilot for Aimsweb testing”; and “I’d say it has also replaced the need for cameras and video recorders.” One respondent indicated the iPad did not replace any technology. “None, I still use my laptop. Not everything is Mobil[e] device friendly. But it will be.”

Research Question 6. *How do professional support staff perceive the usefulness of professional development to the successful use of the iPad device as a classroom-*

learning tool in the study school district? The researcher transferred responses into an Excel spreadsheet, coded and identified the emergent themes from open-ended statements to address Research Question 6.

Professional development. The majority of participants perceived that professional development could increase the effectiveness of the iPad. Responses included, "[if] there was more training around how to use it for people with different roles in the building" and believed the device should "[come] with training on the tons of applications that are out there for learning." Respondents also indicated the need on how to use the device effectively. One statement in response to the open-ended question, *The iPad could be more effective if it….* "came with district support and instruction on ways for staff members like myself (who aren't teachers) to use it effectively." Participant responses noted the Internet, other individuals and professional development/professional resources as the best sources of information. Responses included, "other colleagues"; "Google searches"; and "Training provided at school, or asking people who are more experienced with it."

Content and Technology Facilitators

The researcher identified four individuals eligible for a face-to-face interview. Three of the participants were classified as district content facilitators within the study school district and one individual had the title of assistant administrator of teaching and learning. For the purposes of this study, the research population and participants were referred to as content and technology facilitators. At the end of the first interview, the researcher discovered that the device only recorded the reading of the first question. The respondent agreed to take the interview questions and type responses to each question, all

other interviews were recorded as planned. Upon reflection regarding the types of data collected the researcher found the data represented a category not in the original design and as the research progressed the researcher realized there was a gap and added two research questions to address the data the researcher had approval to use.

Research Question 7. *How do district content and technology facilitators in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?*

Research Question 8. *How do district content and technology facilitators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?*

The researcher interviewed 75% of the eligible population of district content facilitators. Participants were asked six interview questions (see Appendix E). Six themes emerged from the interview transcriptions to address Research Question 7 (RQ7) and Research Question 8 (RQ8). The six emerged themes were: access; student tool; device functions; iPad replacing technology; assessment; and professional development. Overlapping themes existed from the classroom teacher themes from Research Question 1 and Research Question 4 and the professional support staff themes from Research Question 3 and Research Question 6.

Research Question 7. *How do district content and technology facilitators in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?* The researcher transcribed responses into a Microsoft Word document, coded and identified emergent themes from the interview responses to address Research Question 7.

Access. The iPad provided constant access to technology, online resources and specifically constant access to the same device. One response indicated, "access is the first thing that comes to mind" regarding perceived usefulness of the iPad. Another response indicated, "to have access to a variety of media and resources that students collect and that's new and that's pretty exciting 'cause they can take it with them from school to school and grade to grade." Another respondent noted, "The iPad supports the development of research skills. Since so many resources are available at a students' fingertips and there are a variety of ways to organize one's thinking, students have tools that make researching more accessible."

Student tool. Participant responses noted increased student collaboration, extending and transforming learning and potential for student creation. Responses included, "the iPad really represents us responding to a new and current way of learning for students"; "now you can talk to other classrooms, now you can talk to professionals, now you can talk to other countries, so, that is an example of really transforming the learning"; "When given the opportunity by teachers, students use the iPad for self-directed learning and their creativity increases as they make decisions about how they will learn, how they will organize what they learn so they can use their learning, and how they will share their learning with others. Students are doing more independent problem solving"; "I think the iPad will support kids in becoming those creators of information, creators of their knowledge, sharing their knowledge in ways that they haven't been able to do because they didn't have that iPad right there."

Participant responses noted a usefulness of the iPad when student learning is one-to-one. Responses indicated, "every student having technology in their hands and being

able to take that home is a real benefit"; "the student perspective that the kids have this technology with them all the time and it really changes things"; and "individual assigned iPads that are the students iPad it's just a game changer because you're putting really meaningful technology in their hands all the time and even beyond the classroom." Participants noted fostering student engagement and student ownership of work with the iPad. One response regarding student ownership noted, "Teachers have also reported that their teaching strategies are shifting because students are taking more ownership of their learning." Another response noted the increase in students turning in homework in one classroom. "So part of that might be the newness of the iPad and the engagement that it created, but it also might be we know a lot of kids do their homework, but the act of actually getting it back to school and turned in for some kids is really hard and [homework] doesn't happen for a variety of reasons, and the iPad may take care of that." The ability to create a personalized learning device with the iPad was addressed in several responses which included, "what I think will be different or has the potential to be different about this this whole piece about it being a personal learning device is different than we've seen with other technology" and "[the iPad] is a device that is associated with an Apple ID, which is really a digital portfolio for students that they can keep over the years."

Device functions. One respondent noted the iPad is "a great collector of information" and specifically cited the camera as a way to "collect and curate information with the iPad so you can also create." The iPad "allows students to capture images and video clips of what they are seeing as they are learning and then reflect on those images. It can also be used to capture images of the students as they are working or performing a

skill and then students can reflect on their performance and set goals for what they need to work on." Another respondent also cited the camera as "a very effective feature." One response noted the fluidity of the device and how apps and device tools work together as unique to the device. "[E]very feature of the iPad is integrated with other features of the iPad. So, if you're creating a document you can use your photos, you can use music, you can use… any resources that you find online, you can quickly take a screen shot, you can do a movie, everything can be combined into a multimedia presentation or even just an archive." The iPad device can be used at school online and then downloaded materials can be accessed at home without an Internet connection. Specific functions and tools noted by the respondents included messaging, alerts, and the reflection tool. One response regarding the reflection tool stated, "The teacher's iPad and student iPads can be reflected on the ActivBoard, allowing someone's thinking to be instantly shared with the rest of the class. This also seems to be increasing engagement and critical thinking as students try to find something or show something in a different way." A few responses noted other device functions of the iPad such as "personalized learning environments"; "new things with the technology that couldn't be done previously"; "transforming the instruction, transforming the learning." Statements regarding the mobility and portability of the device indicated, "it's much more portable it's lightweight, and so, durable" and "The iPad is a great tool for the teacher because it is the teacher's personal portable device."

iPad replacing technology. Several responses noted the iPad device was meant to complement existing technology. One respondent noted the comparison of the iPad and laptop. "iPads are the primary or at least a portable device that is the primary

learning technology and we use laptops in pretty specific ways." Other responses indicated the intention of the iPad is not to replace laptops, "they're two different devices and they're not designed to replace each other"; "So there's things you can do on a laptop that you can't do on an iPad and there's things you can do on an iPad that you can't do on a laptop. So the comparison… is kind of a misnomer, it's more of a complement." One response indicated teachers replacing prior practices with technology: "But other teachers are replacing things that they did before the ActivBoard….It took the place of the overhead, the iPads taking the place of a notebook for some teachers and their students."

Assessment. Participant response indicated students self-assessing with the iPad device and formative assessment has changed with the device.

Teachers have reported that their ability to 'check in' on learning targets along the way has increased, so when it is time for a summative assessment, there have already been a number of opportunities for feedback that it is truly a time for the student to show what they have learned. This is what assessment for learning is all about.

Research Question 8. *How do district content and technology facilitators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?* The researcher transcribed responses into a Microsoft Word document, coded and identified emergent themes from the interview responses to address Research Question 8.

Professional development. Participant responses indicated initial professional development on the iPad as minimal with a focus on the basics. Responses included, "setting the stage for this type of device, a portable personal device"; "just trying to build the same consistent message and create more awareness of all the thought and

preparation that had gone into this big shift" and "We gave the teachers the iPad a year before we gave [it to] the students thinking of professional development, wanting them to try things on their own." Participant responses indicated new professional development opportunities beginning June 2013 as the district prepared to roll out one-to-one iPad devices. One participant noted professional development opportunities on a smaller scale offered during the 2012-2013 school year after one-to-one implementation of teacher iPad devices. "In addition to those, … planned professional development, we also as a team, tried to incorporate the iPad into any professional development we did. So we had teachers bring their iPads and use them just like a personal learning device." One participant response indicated the district TLG as a source of professional development in the district at each building.

Technology Leadership Group…had regular sustained professional development where they learned about the iPad about using the iPad with students and about how to teach teachers or work with teachers in their building. They will become the onsite professional development resource for teachers…We think we know we cannot do this without having onsite people.

Another response indicated, "the professional development is essential we just have to find the ways to provide it that all people can access it."

Summary

This chapter presented a brief overview of the purpose of the study, methodology and research population. Quantitative data analysis revealed the classroom teachers did not perceive the positive effects of the iPad device on classroom instruction and practices while the professional support staff did perceive the positive effects of the iPad device to

support classroom instruction. Qualitative data analysis revealed common themes of access; iPad as a student tool; device functions; iPad replacing technology; and professional development from classroom teacher and professional support staff survey responses and district content and technology facilitator interviews.

Chapter Five will provide a discussion of the findings, implications of the research, and recommendations for future studies.

Chapter 5: Discussion and Reflection

The purpose of this study was to measure the perceptions of teachers, administrators, and professional support staff on the use of the iPad for instruction and daily educational activities. The researcher conducted a mixed methods study utilizing quantitative data in the form of a Likert-rating scale and qualitative data in the form of open-ended responses and interviews. Quantitative data revealed teachers did not perceive positive effects of the iPad device on classroom instruction; however, professional support staff did perceive the positive effects of the iPad to support classroom instruction. Qualitative data presented emerged themes with each role-specific group. The data analysis revealed overlapping themes with the most prominent noted as: iPad as a job specific tool; iPad as a student tool; and professional development in learning how to utilize the iPad in an educational setting.

Summary of Results

The findings of this study addressed the perceptions of educators within one Midwest school district regarding the iPad device while the district moved to a model of one-to-one implementation. Perceptions can affect the success of a technology initiative (Raulston, 2009), and the results of this study contributed to the growing research related to mobile technology and educators' perceptions of technology implementation. The discussion of the quantitative results was organized according to the researcher-defined role-specific groups: administrators, classroom teachers, and professional support staff. The qualitative data results were presented according to three emergent themes: job specific tool; student tool; and professional development.

Interpretation of Results

Classroom teacher. This category of research participants included classroom teachers, instructional specialists, content specific teachers, special school district teachers, and other teachers in the regular routine of teaching students. The quantitative results revealed classroom teachers did not perceive the positive effects of the iPad device on classroom instruction. The researcher did not anticipate these results, rather expected classroom teacher participants to perceive positive effects of the iPad. Carnine (1984) noted teacher confidence that computers will benefit student learning, as one of several factors affecting teacher technology implementation. The researcher questioned whether the results could be due to length of time with the iPad device, or whether the lack of evidence to support an increase in learning were reasons for the results. Participant responses to the classroom teacher survey revealed agreement to five statements (see Table 13) related to classroom instruction based on comparison of the percentage of agreement to disagreement.

Table 13.

Z-test for Difference in Proportion for Classroom Teacher Survey

Question	Strongly Agree/Agree	Strongly Disagree/Disagree	Null Hypothesis
1	36.6	61	Reject
2	45.9	21.6	Reject
3	64.8	5.4	Reject
4	27	51.3	Reject
5	70.3	10.8	Reject
6	33.4	38.9	Did not reject
7	33.4	38.9	Did not reject
8	100	0	Reject
9	40	40	Did not reject
10	43.2	40.5	Did not reject
Average	49.46	30.84	Did not reject

Note: Rejection of the Null Hypothesis indicated no significant difference when comparing agreement to disagreement.

Agreement statements indicated classroom teachers perceived that the iPad device was easy to use in the classroom; a valuable tool for improving classroom instruction; students were able to use the iPad with little to no training; they were able to seek out information from others; and the classroom teachers had changed classroom strategies and methods.

Professional support staff. The participants in this group were individuals such as librarians, counselors, special school district staff, and other individuals not in the regular routine of teaching students. The quantitative results indicated professional support staff did perceive the positive effects of the iPad to support classroom instruction. The researcher anticipated these findings. Librarians from the professional support staff were individuals, who at the time of this study, were in year 2 of the iPad implementation. The length of time that some members of this group had to access the iPad may have effected their positive perceptions of the iPad as a classroom support.

Overall, professional support staff perceived positive effects of the iPad to support classroom instruction. Results from six statements on the professional support staff survey (see Appendix C) indicated a higher percentage of agreement compared to one response with a higher percentage of disagreement. The agreement survey statements indicated regular daily use for job functions; the iPad device was easy to use; iPad replaced other technology; was helpful in seeking out information from others; and the device was useful to assist teachers. Table 14 summarizes the percentage of agreement from the professional support staff on survey prompts for questions 1 through 7.

Table 14.

Percentage of Agreement for Professional Support Staff Survey

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Average %
Positive Perception	83.4	45.5	90.0	75.0	66.6	30.8	46.2	62.5
Negative Perception	8.3	27.3	0.0	25.0	25.0	53.8	30.8	24.3

Qualitative themes. The coded classroom teacher open-ended response statements presented seven themes: applications (apps); access; teacher tool; student tool; device functions; iPad replacing technology; and professional development with the largest response related to the themes of teacher tool, student tool, and professional development. Additional outlier themes also emerged. They were time and 21st century skills. The coded professional support staff open-ended response statements presented six themes: apps; access; professional support staff tool; device functions; iPad replacing technology; and professional development with the largest response related to professional support tool and professional development. The coded district content and technology facilitator interviews presented six themes: access; student tool; device functions; iPad replacing technology; assessment; and professional development with the largest response on the iPad as a student tool and professional development.

Overlapping themes emerged from the three role-specific qualitative sources. They were: access; device functions; iPad replacing technology; and professional development. Additionally, the overlapping theme of “apps” emerged from the classroom teacher qualitative data and the professional support staff qualitative data. Classroom teacher theme of “teacher tool” and professional support staff theme “professional support staff tool” addressed job or daily functions specific to district-specific roles that the researcher combined for discussion purposes and titled “job

specific tool." In addition to the themes overlapping, "student tool" overlapped with district content and technology facilitator data and classroom teacher data. For the purposes of this discussion, the researcher addressed the themes of job specific tool; student tool; professional development; and the outlier themes from the qualitative data.

Research Questions RQ1, RQ2, RQ3, and RQ7

Research questions RQ1, RQ3, and RQ7 will be answered collectively due to overlapping themes. No definitive answer regarding RQ2 was available, due to the low-response rate.

RQ1: How do classroom teachers in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?

RQ2: How do administrators in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ3: How do professional support staff in the study school district perceive the usefulness of the iPad as a classroom-learning tool?

RQ7: How do district content and technology facilitators in the study school district perceive the usefulness of the iPad device as a classroom-learning tool?

Job specific tool. Classroom teacher participant responses noted the use of the device as a teacher tool for daily functions unrelated to instruction, and these findings were consistent with the 2011 iPad pilot exit survey results that indicated daily usage of the iPad for grade book, email, and web browsing (see Table 10). Professional support staff responses noted the use of the device did not change daily job functions. Responses indicated participants replacing old practices with the technology. The classroom teacher data and professional support staff data were consistent with the results of the 2011 iPad

pilot exit survey results (see Tables 9-10) and Dible (1970), who noted the evolution of tools while functions often remain the same. One classroom teacher noted no change had been made to instructional practices by using the iPad device, which was supported by the professional support staff responses. Adiguzel et al. (2011) acknowledged the difference between actual teacher technology usage and intentions to use; attributing the difference to the varying levels of teacher commitment and use dictated by the district.

Student tool. District content and technology facilitators and classroom teachers indicated the importance of one-to-one student implementation. Classroom teacher participant responses overwhelmingly indicated the usefulness of the iPad as a student tool with many responses noting the importance of each student having a device. The 2011 iPad pilot exit survey results indicated 57.1% of participants supported or strongly supported one-to-one student implementation (see Table 11). Spires et al. (2012) cited one-to-one initiatives as a potential for authentic learning while Apple (2008) and Zhao (2010) noted learning in the 21st century needs to be authentic. District content and technology facilitators noted the relevancy of the iPad to a new way of learning. Ohme (1973) believed educators needed to associate relevance and education.

Classroom teacher participants and district content and technology facilitator participants noted an increase in student ownership of learning. Technology is a part of students' everyday lives (Davis, 1968; Geck, 2006; Means, 2010; Prensky, 2013; Richardson, 2012; Swan et al., 2005; Tell, 1999; Turkle, 1984). Students naturally learn with technology (Palfrey & Gasser, 2008; Prensky, 2006). Responses acknowledged students becoming teachers—teaching other students and teaching their teachers. Tell (1999) stated students use devices with ease and teach teachers. The teacher's role

needed to change from teacher to master learner (Richardson, 2013), with student and teacher collaboration in learning (Apple, 2008; Carroll, 2000; Richardson, 2013). District content and technology facilitator participant responses noted increased student directed learning with the iPad while classroom teacher participants expressed concerns regarding students' ability to self-direct. Classroom teacher responses noted increased student engagement and motivation with the technology. Research by Li (2007) supported increased student motivation. Students learn skills with technology for the future (Li, 2007; Prensky, 2006). District content and technology facilitator responses noted the iPad as a personalized learning device utilizing an Apple ID to house student work, with students in the study school district keeping the device from year-to-year. Life has become very personalized and customized (Collins & Halverson, 2009; Richardson, 2012).

Research Questions RQ4, RQ5, RQ6, and RQ8

Research questions RQ4, RQ6 and RQ8 will be answered collectively due to overlapping themes. No definitive answer regarding RQ5 is provided, due to the low-response rate.

RQ4: How do classroom teachers perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ5: How do administrators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ6: How do professional support staff perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

RQ8: How do district content and technology facilitators perceive the usefulness of professional development to the successful use of the iPad device as a classroom-learning tool in the study school district?

Professional development. Classroom teacher responses and professional support staff responses indicated the need for more training. Content and technology facilitators indicated staff received a basic training; several responses from classroom teachers and professional support staff confirmed basic professional development regarding the iPad. Content and technology facilitator respondents noted the lack of professional development that was purposeful for teachers to try out the iPad on their own. Insufficient training is a common theme regarding professional development (Caverly et al., 1997; Koehler & Mishra, 2009).

Participant responses indicated teachers want training regarding how to use the device with students; training for daily and classroom use; and specific training for use in content specific areas and curriculum connections. Professional support staff participant responses indicated professional development could increase the effectiveness of the iPad, but teachers needed more training. Raulston's (2009) research regarding teachers' perceptions of a laptop initiative indicated once teachers received training they were able to incorporate technology and change practices. Participant responses also noted the need for professional development to connect content areas or the curriculum with the

iPad and apps. Moersch (1995) stated an invalid assumption is that individuals attending professional development can connect the curriculum and technology.

An overwhelming number of classroom teacher responses and professional support staff responses indicated teachers sought out information from colleagues and district technology personnel regarding the iPad device. Content and technology facilitators and classroom teachers noted the Technology Leadership Group (TLG) as a source of information with content and technology facilitators stating the TLG would be a source of onsite professional development. High quality professional development and ongoing support are necessary for technology implementation (Bouterse et al., 2009; Spires et al., 2012). Quinn et al. (1983) noted teacher involvement in staff development should happen at the beginning and teachers need to be involved in technology implementation from the onset (Killian, 1984; Oakes & Schneider, 1984)

Outlier themes. A few responses fell outside the emergent themes yet the researcher believes they were relevant and worth noting. Time, whether it was lack of time as a teacher or time to use the device and apps recurred a handful of times in the classroom teacher survey. The theme of time is supported by O'Neil (1995) who acknowledged time as a barrier to implementation. It was suggested that the lack of time available was supported by pervious research indicating technology created more work for the teacher (Collins & Halverson, 2009; Means & Olson, 1994; Peck & Doricott, 1994).

Twenty-first century skills were, to the surprise of the researcher, not noted often by the research participants. The lack of acknowledgement by the participants suggested a missing connection on the iPad and the relevance of education and 21st century skills.

The 2011 iPad pilot exit survey indicated 78.6% of participants felt the iPad was relevant or very relevant to the technology future of the study school district. Murray and Olcese (2011) acknowledged the built-in functions of the iPad to support 21st century skills. Content and technology facilitators noted the district technology literacy curriculum was based on ISTE National Education Technology Standards and on skills for a 21st century learner. The current literature noted a connection between the iPad device as one way to increase student creativity and collaboration (Foote, 2012; Shareski, 2011) both fundamental skills of 21st century learning.

Implications of the Study

The results of the study provided implications for the researched school district to address regarding perceptions of the iPad as the district moves ahead with the one-to-one student iPad implementation rollout in 2013-2014. Overall, classroom teacher responses, district content and technology facilitators, and the 2011 iPad pilot exit survey saw the value in iPads and were willing to support the one-to-one implementation. Research noted the popularity of the iPad for the one-to-one implementation in schools (Asher-Shapiro & Hermeling, 2013) and professional support staff results from this study perceived a positive effect of the iPad as a support for classroom instruction, however, overall classroom teachers did not perceive the positive effects of the iPad on classroom instruction as supported by Li's (2007) technology integration research.

Technology constantly changes (Means & Olson, 1994). A recommendation for the district would be to create a professional development plan addressing areas based on the needs of the staff by developing a survey assessing the desired areas of learning. Quinn et al. (1983) supported the early involvement of staff in professional development,

while Spires et al. (2012) stressed the importance of professional development in the one-to-one initiatives. Additionally, the district should provide a resource regarding iPad device functions and apps that connect with content areas and the curriculum.

While mobile technology and mobile learning are currently popular in education (Asher-Shapiro & Hermeling, 2013; Bouterse et al., 2009; Murray & Olcese, 2011; Spires et al., 2012), technology will continue to evolve (Dible, 1970; Stevens, 2011) and will require 21st century educators (Greenhill et al., 2010). This would involve educators learning along with students (Cookson, 2009); being responsible for practicing 21st century skills (Greenhill et al., 2010); and acquiring skills to handle evolving technology (Scobey, 1972; Lesgold, 1986; Prensky, 2008b). Just as rapidly as technology changes, methods utilized to foster 21st century educator skills would need to be in constant evolution. Thus, the study school district will need to be forward thinking in order to accommodate this constant state of change.

Stated expectations or guidelines regarding the iPad device as a job specific tool, a student tool, and for classroom use would alleviate the unknown for educators. The "why" is important especially when dealing with the challenge of constantly changing technology. Individual level of implementation will vary and an accurate measure will become necessary (Adiguzel et al., 2011).

The researcher encourages the researched school district to consider these implications when planning for future professional development and iPad related technology expenses.

Recommendations

As the TLG iPad pilot exit survey data from 2011 suggested, members of the study school district perceived the iPad device as relevant to the future of the researched school district. Based on the findings from this study, the researcher developed recommendations for future studies; possible changes to the current study based on the researcher's study and recommendations for the replication of study.

Future studies. The researcher would recommend future studies to assess the role "mindset" plays in technology implementation. Mindset defined by Dweck (2006) would be important to consider because the researcher believes one's mindset affects use of technology and technology implementation. Another recommendation for future studies would be to assess student learning with the iPad to see if a relationship exists and the application of the device as an instructional tool resulted in gains of student achievement. Since the beginning of this study, exponential changes with technology have occurred leaving the researcher to question the current perception results found within this study. The nature of technology leaves room for future studies to continue to assess perceptions. The researcher would also suggest future studies include the effects of implementation across all levels of learning and educational organizational structures. One specific recommendation would be for continued data collection regarding the study school district's TLG concept and the role of this group in shaping professional development as it relates to the use of technology. A final future study recommendation would be on the study school districts "scout" concept and the impact this would have on perceptions and implementation.

Changes to the researcher's study and replication of study. Due to the rapid shift in the research school district's technology implementation noted by the amount of change in the study school district from piloting iPads one year (when the researcher chose the study topic); to teacher the one-to-one implementation the next year (when the researcher received IRB); the one-to-one implementation student scout (when the researcher conducted the study); and eventual student the one-to-one approval the researcher could not stay current due to so many changes. The researcher would have conducted the study immediately after IRB approval instead of later in the year in anticipation that the results would have yielded a larger number of participants due to the one-to-one teacher implementation; and would recommend to anyone replicating the study not to wait in anticipation of better results.

Regarding instrumentation, the researcher would have utilized a pre-existing survey instrument or designed one survey to address all individuals. The researcher would have conducted, and would recommend to a researcher replicating this study, a pilot of the research questions to gather feedback based on the survey to anticipate participants not completing the survey. The researcher would have considered doing a pre and post survey once one-to-one teacher implementation was approved. The researcher would have also offered a paper survey and an online survey and had participants give their consent by clicking the link as participants who gave consent by clicking the link accounted for 45% of the responses. The researcher would have requested to speak at an administrators meeting or personally invite administrators to participate in an effort to increase online survey participation and data analysis from that research participant group. Knowledge regarding the participant's status as a digital

immigrant or digital native would have led to possible correlations between age grouping(s) and perception(s). The researcher also would have wanted to know if there was a difference in elementary, middle, or high school participant perception of the iPad.

Summary

The main purpose of this study was to assess the perceptions of classroom teachers, administrators, and professional support staff groups regarding the iPad device, which is a timely topic due to the move to one-to-one implementation for teachers and students over the last one to two years in the study school district. The results of this study revealed overall teachers did not perceive the positive effects of the iPad device on classroom instruction; however, professional support staff did perceive the positive effects of the iPad to support classroom instruction. The qualitative results indicated three emergent themes across all participant groups: the iPad as a job specific tool; the iPad as a student tool; and the need for professional development. The need for addressing the perceptions of those integrating exponentially developing technology such as the iPad is insistent, to successfully implement the iPad, as the study school district moves forward with student one-to-one implementation.

Appendix A

Classroom Teacher Participant Survey Questions

1.	**I used iPad devices regularly with my students in the classroom.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One way I use the iPad device with my students				
2.	**I find it easy to use the iPad as an instructional device in the classroom.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
The iPad is easiest to use when *A problem I have encountered with using the iPad in my classroom*				
3.	**The iPad is a valuable tool for improving my classroom instruction.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One of the most valuable aids to my instruction from using the iPad is *One way the iPad could be made more valuable as an aid to my instruction is*				
4.	**The iPad replaces other technology in my classroom.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One piece of technology which the iPad replaced is *The iPad's main value as technology in my classroom is*				
5.	**My students are able to use the iPad device with minimal or no training.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One way that my students have learned on their own to use the iPad device is *My students could have used the following kind(s) of training*				
6.	**My students are using the iPad device to guide their own learning.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
For example, one way they show responsibility for their own learning is *One concern I have with the iPad as a self-directed learning device is*				
7.	**The training I received in using the iPad device as a classroom-learning tool was effective.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
My training in use of the iPad was particularly useful in *I could have used additional training in the area(s) of*				

8.	**I have sought out information from others on their experiences with the iPad.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
My best source of information was				
9.	**I am aware of the district expectations on use of the iPad in my classroom.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
What does the district expect for teacher use of the iPad in the classroom?				
10.	**The iPad has caused me to change my classroom strategies and methods.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One instructional strategy that is new or I have changed is *The iPad has not affected my classroom methods and strategies, however I find it most use for*				

Appendix B

Administrator Participant Survey

1.	**My teachers use the iPad device regularly in the classroom with students to improve learning.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One example of teachers doing this is *One problem teachers face with using the iPad in the classroom regularly is*				
2.	**The iPad device has replaced other available technology tools in my school.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One technology tool that the iPad device has replaced is				
3.	**Teachers believe that the iPad is an effective tool to use in their classrooms.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Some of the comments from teachers are				
4.	**Students appear to be using the iPad device with little or no guidance.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
An example or two of this is *One way to increase student self-directed use of the iPad device would be*				
5.	**The iPad device allows students to take responsibility for guiding their own learning.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
What is an example that shows students taking responsibility for their own learning using an iPad?				
6.	**The training my teachers received in using the iPad device as an educational tool in the classroom was effective.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
This is evident based upon the following observations: *Training could have been better if it include*				
7.	**I have sought out information from other principals on the use of the iPad by their teachers.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Some of the comments from my colleagues are				
8.	**My teachers and I are aware of the school district's expectations on use of the iPad in our building.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One of the expectations for the administrator's role is				

Appendix C

Professional Staff Survey

1.	**I use the iPad device regularly to facilitate, enhance, and improve job functions.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
What is one of the most effective ways that using an iPad device facilitates, enhances, and improves your job functions? *The iPad could be more effective if it*				
2.	**The iPad device has replaced other available technology tools in my job.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One technology tool that the iPad device has replaced is				
3.	**The iPad device is easy for me to use in my job.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I find that the iPad device is easiest to use when *One difficulty I have experienced with the use of the iPad in my job is*				
4.	**I have sought out information from other sources on using the iPad in my job.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Where did you find the best source of information?				
5.	**I am aware of the district expectations on use of the iPad for my job.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
What does the district expect for use of the iPad in your job?				
6.	**My daily functions have changed since I began using an iPad device for my job.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
How have your daily functions changed?				
7.	**The iPad is useful to me as I assist teachers to improve their classroom instruction.**			
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
One example of my use of an iPad to support teachers in classroom instruction is *One reason why the iPad has not been useful to me in assisting teachers to improve their classroom instruction is*				

Appendix D

Permission to use P21 Framework Graphic

Re: Rainbow graphic and framework

From: Tatyana Warrick <tatyana@p21.org>
To: Andrea.Beckerle@kirkwoodschools.org
Date: Tuesday - July 30, 2013 2:55 PM
Subject: Re: Rainbow graphic and framework
Attachments: Mime.822

Dear Andrea,
Please feel free to include the P21 Framework as part of your dissertation, along with any other pertinent resources from our website. Please cite P21 and our website. Thank you and let me know if you have follow up questions or concerns. All the best on your timely dissertation work!
Best,
Tatyana
P21 Communications Manager

Sent from my iPhone

On Jul 30, 2013, at 2:04 PM, "Andrea Beckerle" <Andrea.Beckerle@kirkwoodschools.org> wrote:

> Tatyana,
>
> Thank you so much for returning my call! I am very excited to have permission to use the P21 graphic in my dissertation. I would like to include written permission in my dissertation appendix so thank you for providing that option in your voice mail.
>
> I look forward to your response!
>
> Andrea
>
> Andrea Beckerle, Art Teacher
> Westchester Elementary
> Kirkwood School District
> andrea.beckerle@kirkwoodschools.org
> 314.213.6100 x6212
>
>

Appendix E

District Content and Technology Facilitator Interview Questions

Technology Facilitator Interview Questions

1. Now that the iPad device has been introduced into the classroom as a learning tool, what are your perceptions of its usefulness?
2. How has the use of the iPad device affected teachers' classroom strategies and methods within the school district?
3. Are there particular iPad functions that you perceive to be more effective for classroom use?
4. Have you compared the iPad to other district technology tools for classroom use? What are your findings? Have teachers within the district commented on their use of technology within the district?
5. Can you describe the type and extent of professional development provided for teacher use of the iPad device in the classroom? Has professional development had an impact on the use and effectiveness of the iPad as an instructional tool?
6. Does the district have a broader plan for use of the iPad as an instructional device in the classroom? What is the current status of the plan?

District Content Facilitator Interview Questions

1. Now that the iPad device has been introduced into the classroom as a learning tool, what are your perceptions of its usefulness?
2. How has the use of the iPad device affected classroom teaching strategies and methods within the district as gathered from the teachers?
3. Are there particular iPad functions that you perceive to be most effective for classroom use?
4. Have you compared the iPad as a classroom tool with other district technology tools? What have you found? Have teachers within the district commented on their use of technology?
5. Can you describe the type and extent of professional development provided for teacher use of the iPad device in the classrooms? Has the professional development had an impact on the use and effectiveness of the iPad as an instructional tool?
6. Are you aware of an overall district plan for the use of classroom technology within the district? What is the status of the district plan?

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Vitae

Andrea Beckerle is from St. Louis, Missouri. She joined the Kirkwood School District in 2005 as a K-5 elementary art teacher. She is an active member of her school's beautification committee; the district K-12 art cohort; and will be a first time coach for her school's "Girls on the Run" team in fall 2013.

Andrea graduated from Lindenwood University in 1996 with a Bachelors of Fine Art in Studio art with an emphasis in ceramics and a Bachelors of Art in Art History. In 2005 she earned a Masters of Art in Teaching from Lindenwood University and obtained her teaching certificate for K-12 art education. She completed her Educational Doctorate in Instructional Leadership from Lindenwood University in Fall 2013.