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The Perceived Impact of 1:1 iPad Implementation on Teaching and Learning: A Pedagogical Case Study

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The Perceived Impact of 1:1 iPad Implementation on Teaching and Learning: A
Pedagogical Case Study

By
Amy Marie Neaves

A Dissertation Submitted to the
Gardner-Webb University School of Education
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Gardner-Webb University
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Approval Page

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Acknowledgements

I dedicate this work to my grandmother, “Mamaw,” Mary Florence Campbell Neaves, who always told me to pay no mind to boys and to get my education. I hope I’d make her proud this day for making it this far.

Thank you so very much to my wonderful parents, David and Joyce Neaves, who worked full-time jobs while furthering their educations when I was growing up, who taught me the crucial value of a good education, who have always been with me and supported me in all endeavors, and who bought me the first edition iPad for my birthday in 2010; forever changing the path of my career, my pedagogical beliefs, and my role as a lifelong learner. I love you both more than words can ever express.

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To the “kids on the other side of the tracks,” never give up, and never stop dreaming.

Abstract

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This study aimed to examine teachers' perceptions of technology and its impact on their lesson planning and implementation as well as student learning in a one-to-one iPad environment. While student achievement was an intended goal of the initiative, the evolving role of the teacher within this environment had a potentially large impact on its success in meeting all learners' needs. Much of the research surrounding instructional technology and its impact relates to defining and measuring students' success, leaving the critical role of the teacher with little to no data. The research surrounding this study brought to light a variety of factors that could impact the pedagogical work of teachers in a technology-rich setting such as that of the case studied here.

A case study of the school was selected in order to tell the stories of the teachers involved in the one-to-one iPad program. Survey and interview questions were adapted to support the theoretical framework of the research and the research questions that guided this work. Responses to those questions, along with reporting and analysis of baseline and archival data, were used collectively in order to explain the unique case at the school. This study sought to provide insight into the perceptions of the impact of this initiative on both teaching and learning through the ubiquitous access to mobile devices such as the iPad. Implications of the results of this study were intended to be utilized for continuous research on the pedagogy in one-to-one programs, on how technology integration influences teachers' lesson planning and implementation.

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Chapter 1: Introduction and Problem Statement

Introduction

When entering classrooms today, do they look any different from those of the past? Aside from the clothing and hairstyles of the students and teachers, are there any signs of new life? Much ado has been made about 21st century classrooms providing a student-centered, technology-rich learning environment in which learners prepare for work and success in today's global economy; however, after a decade of being in the 21st century, the majority of schools show little to no evidence of transformation (Jacobs, 2010). Jacobs (2010) pondered the students' thoughts as they enter schools today, putting their 21st century, tech-filled lives on hold throughout the school day. Jacobs asserted that educators are charged with the responsibility of matching students' needs to a rapidly changing world. Unfortunately, many teachers do not have either the resources available or the training and support to promote 21st century teaching and learning.

Despite the barriers, school districts across the nation are attempting to change the classroom within their financial means. Some districts seek funding in order to construct 21st century classrooms, including technologies that support innovative teaching and learning experiences. The initiatives funded vary widely based on the district's vision and goals as well as on the amount of funds acquired. Ormiston (2011) identified budgeting for technology as a major roadblock to change for our schools. The funding necessary for technology-rich classrooms will be attainable when school districts make technology a priority (Ormiston, 2011).

Technology initiatives are driven by the supporting research and guidelines as provided by organizations like the Partnership for 21st Century Skills (P21), whose student outcomes include Information and Communication Technology (ICT) skills. The

purpose is to promote students' effective application of technology in order to research, evaluate, organize, and communicate information as well as to access, create, manage, and integrate information (P21, 2003). This is an integral piece of the 21st Century Skills Framework, one that needs consideration in efforts to update schools and to prepare the future-ready child.

One technology initiative that has been adopted by districts in order to fulfill the growing needs of the future-ready child is known as one-to-one (1:1) computing. In 1:1 computing initiatives, one or more technological devices are available to each learner everyday within the classroom setting and, if possible, beyond (Chan et al., 2006). Since Apple Computers initiated the first 1:1 program with desktop computers in 1985 (Baker, Gearhart, & Herman, 1990), instructional technologies available for 1:1 initiatives have evolved with great rapidity and have generated a sense of urgency for districts and educational researchers to elicit support, to ascertain their impact, and to reflect on how to best capitalize on the newest technologies in the classroom.

No matter the type of initiative, a highly significant variable is the teacher and the factors surrounding his/her experiences, abilities, and willingness to implement new programs (Darling-Hammond, 2002). As 1:1 computing technologies grow, teachers are charged with adapting their pedagogy and building their own capacities with respect to technology integration. Factors impacting the successful technology integration of the teacher are both intrinsic and external. Teachers must have the right approach (a positive view of technology, a commitment to lifelong learning, and a clear understanding of thoughtful lesson planning and implementation utilizing technology) (Darling-Hammond, 2002). The support system provided for teachers throughout the implementation process is paramount (ongoing and relevant professional development, a shared vision, guiding

leadership, and a collaborative community that promotes reflective practice) (Mumtaz, 2000). If teacher beliefs do not shift in support of instructional technologies, the integration will not fully occur (Dexter, Anderson, & Becker, 1999, as cited by Di Benedetto, n.d.). With these elements in place, teachers can accomplish the difficult task of integrating technology effectively in the learning environment.

Nature of the Problem

As 1:1 computing initiatives increase in popularity, the need for research about their impact on teaching and learning grows. Often, the emphasis of research is placed on standardized student achievement (Zhao, Pugh, Sheldon, & Byers, n.d.); however, research surrounding the work of educators in 1:1 environments is lacking. The problem facing educational researchers is the somewhat overlooked importance of teachers in 1:1 classrooms, despite researchers' assertions that teachers are the ones who hold the greatest impact on student achievement (Jupp, 2009). Teachers play a pivotal role in students' education and in the overall success of instructional technology initiatives, such as 1:1 computing (Digital Education Revolution NSW, 2010). The evolution of technologies and their place in the classroom require both pedagogical and psychological shifts by the teacher, typically followed by a higher level of technology integration (Digital Education Revolution NSW, 2010).

At iElementary, the elementary school that served as the setting of this study, each teacher and student received a mobile learning device, Apple's iPad, during the summer of 2011. The mission of iElementary is to develop a culture of collaboration in a student-driven and project-based learning environment utilizing emerging technology and 21st Century skills to address the full range of knowledge and competencies students need to excel in a global society. How teachers perceive technology integration at

iElementary during its first few years of a 1:1 initiative will have implications on the accomplishment of its mission and the overall success of the program. Instead of measuring success strictly through standardized test scores, iElementary should provide ongoing support to and promote continuous reflective practice for its most valuable resource, the iTeacher, or the teacher at iElementary. This is because the classroom teacher plans and implements the integration of 1:1 both in and out of the classroom setting (Darling-Hammond, 2002), thus having the most direct impact on student growth and achievement in 1:1 scenarios.

The iTeacher was involved in a singular phenomenon. Compared to the traditional classroom teacher at other schools in the same district, the iTeacher had a classroom full of students, each with his/her own iPad for learning. This unique situation seems ideal for any educator who is willing to treat his/her lesson planning and implementation using technology as a daily challenge, as an experiment, and as a possible game-changer for teaching and learning. Unlike the traditional classroom teacher in the same district, tech-savvy or not, the iTeacher had hardware and applications readily available for daily use for every student; yet the iTeacher was expected to utilize technology in order to facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership (ISTE NETS for Teachers, n.d.). The iTeacher could capitalize on the benefits and features of the 1:1 devices both in and out of the classroom setting in order to accomplish these 21st century teaching standards. These questions remain to be continuously explored and answered at iElementary: Are iTeachers implementing the tools that promote 21st century teaching and learning? How

are they utilizing them? What adaptations have they made to their pedagogy in support of technology integration? What factors are influencing their adoption of new instructional strategies? Those questions were part of the research questions of this study and, through the methodology, afforded iTeachers opportunities to reflect on their practice within the 1:1 setting.

Purpose of the Research

The purpose of this study was to examine teachers' perceptions of the possible impact of 1:1 iPad integration at iElementary on teaching and learning during the first 3 years of implementation. The theoretical framework (Figure 1) of this research was based on the literature reviewed that includes 21st century teaching and learning, instructional technology integration, and 1:1 computing initiatives. Examining iTeachers' perspectives provided insight into the implementation from those involved daily in the 1:1 environment during years 1, 2, and 3 of the school's iPad program. The data paved the foundation for further research of iTeachers' perceptions in the coming years in order to fully understand overall shifts, if any, to iTeachers' pedagogical beliefs, technological abilities, and levels of technology integration.

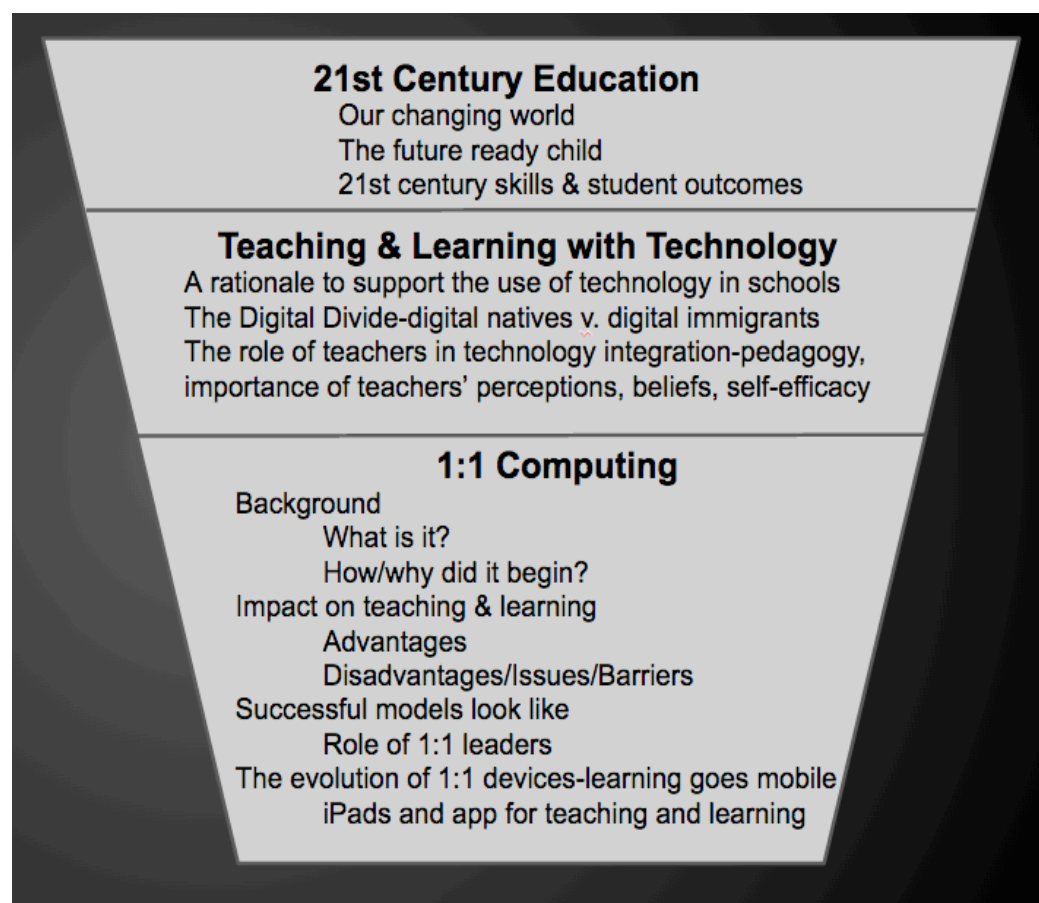


Figure 1. Theoretical Framework.

Background and Significance of the Problem

The impact of instructional technologies on teaching and learning has been widely debated by researchers, practitioners, and lawmakers in an effort to make the case for financial support of technology initiatives. Reports such as *Technology's Impact on Education Practices* by the National School Board Association (n.d.) recommended investing in technology for the potential positive impact on teaching and learning, explaining that the implementation of technology increases the likelihood of teachers presenting more complex material and tasks. This same report asserted that technology use in classroom can support the role of teacher as coach, build educators' self-efficacy,

and provide motivation for students in terms of risk-taking, trying more difficult tasks, and fine-tuning their own work (National School Board Association, n.d.). Combined with student-centered approaches to learning, the technology-rich learning environment can positively affect student learning while developing 21st century competencies (National School Board Association, n.d.). With the ever-changing scope of the teaching profession, it is important to understand the beliefs and practices of educators in these environments in an effort to determine if said practices could be adapted to promote growth in other educational settings.

The rapidity with which technology is changing our schools presents great opportunities but unique challenges to researchers. The types of devices available now for schools to utilize with students brings just-in-time access to information via the Internet and social media as well as an increase in the potential for multimedia content creation (Education Week, 2011). As a result of continuous technology evolution, longitudinal research runs the risk of becoming irrelevant before it is even published for consideration (Education Week, 2011). Devices such as the iPad were acquired before sufficient research could outline their potential for increasing student achievement and impacting the pedagogical practices of teachers (Education Week, 2011). The concepts outlined by this researcher, however, are trends that point to the direction in which teaching and learning is evolving. The fact that schools are embracing the potential afforded our society by various technologies drives the need for more research not specifically on technology itself but on the role that it plays in teaching and learning in 21st century classrooms. Repeated and varied research of concepts that revolve around student-centric learning and future-ready instruction is necessary to gain multiple perspectives of anecdotal evidence to support the increasing need for our schools to

evolve.

In order to make informed decisions regarding 1:1 computing in schools, the findings of past research on teachers and instructional technologies must be considered along with continued studies that provide anecdotal evidence of successful implementation of 1:1 models. Evidences as such can bring the focus back to the role of teacher and the surrounding factors that impact technology integration, from which researchers of 1:1 studies can glean a more in-depth comprehension of what is working and what is not. Penuel (2006) concluded the importance of research syntheses as a means of periodically reviewing extant research on 1:1 in order to provide policymakers, educators, and researchers with the key implications discovered from a range of studies. Phenomenological research studies, such as the one conducted by this researcher, shed light on teachers and their technology use in an effort to promote instructional technology integration by educators as well as continued funding for initiatives that provide access to devices for student learning.

Research Questions

For this study, the questions around which the research was designed and conducted are as follows.

1. Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive?
2. Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation?
3. What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child?
4. Based on the experience of iElementary teachers, which factors influence

teacher self-efficacy?

Research questions were measured and analyzed through iTeacher surveys (which included self-assessed technology benchmarks developed by iElementary during preimplementation), iTeacher interviews, archival and baseline data, and interviews with iLeadership (the administration and instructional support staff at iElementary who conduct classroom observations).

Definitions of Terms

1:1 computing. A term coined by Elliot Soloway and Cathie Norris, 1:1 computing is a ratio of one computing device for every student (Chan et al., 2006).

Apps. Applications that can be retrieved via the App Store on Apple's iPad.

BYOD. Bring your own device; learners provide their own mobile learning devices for use within the classroom setting (Devaney, 2011).

Constructivist teaching.

Based on constructivist learning theory. This theoretical framework holds that learning always builds upon knowledge that a student already knows; this prior knowledge is called a schema. Because all learning is filtered through pre-existing schemata, constructivists suggest that learning is more effective when a student is actively engaged in the learning process rather than attempting to receive knowledge passively. A wide variety of methods claim to be based on constructivist learning theory. Most of these methods rely on some form of guided discovery where the teacher avoids most direct instruction and attempts to lead the student through questions and activities to discover, discuss, appreciate, and verbalize the new knowledge. (Constructivist Teaching Methods, n.d., para

Differentiation.

Instruction tailored to the learners' preferences and needs. Learning goals are the same for all students, but the method or approach of instruction varies according to the preferences of each student or what research has found works best for students like them. (National Education Plan, 2010, p. 12)

Digital disconnect. The disparity between the technological abilities of students and their teachers.

Digital immigrants.

Those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology are, and always will be compared to them. (Prensky, 2001, pp. 1-2)

Digital natives. Students today who are “‘native speakers’ of the digital language of computers, video games and the Internet” (Prensky, 2001, p. 1).

Future-ready child. Part of the future-ready core; the school-age student being educated and prepared for a global economy.

Individualization.

Instruction that is paced to the learning needs of different learners. Learning goals are the same for all students, but students can progress through the material at different speeds according to their learning needs. For example, students might take longer to progress through a given topic, skip topics that cover information they already know, or repeat topics they need more help on. (National Education Plan, 2010, p. 12)

iElementary. The name denoted by the research for the setting of this study.

iLeadership. The collective group of administrators and instructional support at

iElementary.

ICT skills. Part of the P21 (2003) framework.

iPad. “A line of tablet computers designed and marketed by Apple Inc., primarily as a platform for audio-visual media including books, periodicals, movies, music, games, apps and web content” (iPad, n.d., para 1).

iTeacher. Someone who teaches at iElementary.

Mobile devices. Laptops, cell phones, and tablet computers.

Mobile learning. Also known as mLearning; using mobile devices for instruction.

Personalization.

Instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners. In an environment that is fully personalized, the learning objectives and content as well as the method and pace may all vary (so personalization encompasses differentiation and individualization). (National Education Plan, 2010, p. 12)

Preimplementation. Before beginning with planned interventions.

Self-efficacy. “Beliefs in one’s capabilities to organise and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3).

Student engagement. This happens when

students make a psychological investment in learning. They try hard to learn what school offers. They take pride not simply in earning the formal indicators of success (grades), but in understanding the material and incorporating or internalizing it in their lives. (Newmann, 1992, p. 2)

Twenty-first century classrooms. Learning environments in which 21st century

skills are taught.

Twenty-first century skills. Also known as 21st century student outcomes, “Essential skills for success in today’s world, such as critical thinking, problem solving, communication and collaboration” (P21, 2003, p. 10).

Chapter 2: Review of the Literature

Introduction

This chapter outlines the literature closely related to the theoretical framework of the research on the perceptions of teachers who are participating in year 1 of the first 1:1 iPad initiative in one school district. Throughout the research process, several themes and subtopics emerged as significant elements to this study. The major concepts related to the theoretical framework include 21st century education, teaching and learning with technology, and 1:1 computing implementation. Research on teaching with 1:1 mobile devices, such as the iPad, is currently undeveloped and in demand.

The review of literature on 21st century education involved these subtopics: (a) our changing world; (b) the future ready child; and (c) 21st century skills and student outcomes. Globalization and technological innovations have flattened our world, changing the rules of the game as we are playing it. Evolving skills necessary to thrive in an uncertain future require schools to prepare all students for the 21st century workforce. The skills and student outcomes needed for this preparation are nothing new, yet they have long been overlooked and unmet in our schools. This discussion of 21st century education leads to the next section in which the literature about technology as a 21st century tool is reviewed.

Exploration of teaching and learning with technology produced literature on (a) a rationale to support the use of technology in schools, (b) the digital disconnect, and (c) the role of teachers in technology integration. As we progress through this century, a growing digital disconnect has become evident in which students utilize technology effortlessly outside of the classroom while tradition prevails within the confines of the classroom. Essentially, teachers and students are speaking completely different

languages, hindering connections that can enhance the teaching and learning process.

The existing digital disconnect can be bridged through the use of technological tools and 21st century skill building both in and out of the classroom setting. In this chapter, the benefits of technology use in the classroom are discussed as a basis for many schools' rationales to adopt and implement new technologies. The critical role of the teacher in technology integration is explored. Investigations of pedagogical changes, perceptions and beliefs regarding technology, and self-efficacy show the teachers' role as both a crucial and fragile one.

The final section of the review of the literature focuses on 1:1 computing in schools. To begin, the researcher answers background questions to lay the foundation for the research: (a) What is 1:1 computing; (b) When and how did it begin; and (c) How has it impacted teaching and learning? In reviewing the literature on 1:1 computing implementation, evidence of the advantages (student-centered learning, engagement, academic achievement) and disadvantages (issues and barriers) became clear. In analyzing 1:1 computing, the research also led the researcher to inquire: What do successful models look like? How is that success defined? What role do 1:1 leaders (administrators, technology support) play in 1:1 environments? Lessons learned through the evaluation of 1:1 initiatives shed light on the value of them in the 21st century classroom. The critical role of leaders in supporting teachers throughout 1:1 initiatives emerged as well.

The final exploratory piece of 1:1 computing deals with the evolution of 1:1 devices. As teaching and learning go mobile, a myriad of mobile devices have gained popularity in our schools. For example, Apple's tablet, the iPad – along with its many educational apps – has the potential to replace the most commonly used 1:1 device, the

laptop. In fact, most research available on 1:1 computing in our schools deals solely with the laptop initiatives of the past 20 years. With the rapid evolution of 1:1 technologies, there's an immediate need for current, relevant research to support their integration into teaching and learning environments. In reviewing the literature on past research conducted about 1:1 laptop initiatives, there are connections to this study on the new 1:1 iPad initiative.

21st Century Teaching and Learning

The world in which we live is growing and evolving exponentially. Friedman (2005) described the flattening of our world due to globalization and technological innovations. He stated that our world is now flat, meaning that the playing field has been leveled for everyone. Transformational technologies and the rise of the digital age have propagated this flattening. The continuously declining cost of these technologies improves the rate of accessibility for all, thus impacting what and how people communicate and learn (Resnick, n.d.). Technology has changed our world and all its varied cultures and perspectives to be smaller, more relatable, and closely connected (Jacobs, 2010). The rise of innovative technologies has altered the way that we interact with the world.

As our society changes, our schools must evolve in an attempt to mirror those changes. Adapting to a constantly changing world means reforming our current education system continuously in order for American students to compete globally. Seidel asserted that combined globalization and rapid advancements in technology make economic efficiency within the 20th-century system more and more difficult (Wehling, 2007). The great challenge for education is to somehow sync our learners' needs with a world that is evolving with great rapidity (Jacobs, 2010). Wilmarth claimed that "[n]ew

technologies combined with social and cultural adaptations fundamentally change our understanding of knowledge, its creation and authority” (Jacobs, 2010, p. 80). He charged educators with the responsibility to “examine the effects of these trends and respond to the question, ‘What does it mean to be educated in the 21st century?’” (Jacobs, 2010, p. 81).

The way in which we approach education and adjust for this changing world requires a shift from past conceptions of teaching and learning. “In the technological world of the 21st century,” said Di Benedetto (n.d., p. 1), “the meaning of the phrase ‘to know’ means more than simply having information stored in one’s memory; it means having access to information and knowing how to use it” (p. 1). Understanding what and how knowledge is acquired and applying that information to the educational setting permits students to become successful participants in our society. The recognition of this shift dictates the curricula taught as well as the pedagogy, thus requiring educators to constantly reflect on their work, analyze best practices, stay abreast of changes, and apply their lifelong learning to what and how they teach every day.

The paradigm shift from 20th to 21st century teaching and learning necessitated a focus on the student as an individual, a lifelong learner, a creative mind, a collaborator, and a future member of the global workforce. In a published interview (Norton, 2011), education reform advocate Sheryl Nussbaum-Beach asserted that this new student-centric approach to education requires a transformation in the way the majority of educators teach today. The injustice of teaching the 21st century learner in a 20th century manner stems from teachers simply teaching in the same way in which they themselves were taught or from a system of accountability that leads them to believe that they must teach that way (Norton, 2011). The International Society for Technology in Education (ISTE)

determined that “traditional educational practices no longer provide students with all the necessary skills for economic survival in today’s world” (ISTE Standards, 2000, para. 2).

The future-ready child must be instructed as such.

The Future-Ready Child and New Skills

Wagner (2008) argued that our schools have become obsolete as they have not changed with the times. Wagner claimed that new skills are needed in order to compete in today’s global knowledge economy and that we are not developing those skills in our education system, leaving our students at a great disadvantage. We have seen increased drop-out rates in the U.S., while European nations and East Asia have thriving economies due to scientific and technological advances. “If these trends continue,” foresees Darling-Hammond (2010), “by 2012, America will have [seven] million jobs in science and technology fields, ‘green’ industries, and other fields that cannot be filled by U.S. workers who have been adequately educated for them” (p. 3). Darling-Hammond also identified that at least 70% of current American jobs “require specialized knowledge and skills, as compared to only 5% at the dawn of the last century, when our current system of schooling was established” (p. 2). As the future-ready child is routinely educated in our current antiquated school system, the possibility of his/her preparedness to meet specific requirements and thrive in our global economy diminishes.

Reformation of our current system of skills and outcomes is essential to preparing the future-ready child in the U.S. Darling-Hammond (2010) wrote that a democratic education means our teachers must create and implement instructional opportunities that ensure students’ independent thinking, use of information, technology, and knowledge, and development in drawing their own conclusions. P21, a national advocacy group for the future-ready child, created a framework for 21st century learning in order to set new

skills and student outcomes in our schools today. P21 (2003) identified six critical elements for 21st century learning: (1) emphasize core subjects; (2) emphasize learning skills including information and communication skills, thinking and problem-solving skills, interpersonal and self-directional skills; (3) use tools including computers, information and communication technologies, audio, video and other multimedia tools; (4) create authentic learning environments that make content relevant to students (take students out into the world and bring the world into the classroom), create opportunities for interaction with others (teachers, students, experts) within and beyond the school; (5) raise global awareness and increase financial, economic, civic and business literacy; and (6) balance and strengthen standardized and classroom assessments to ensure that they measure the full range of core subject outcomes as well as outcomes associated with 21st century skills in a timely way. These key elements serve as a roadmap for the success of the future-ready child if wholly addressed throughout the educational career of our students.

Other organizations, such as ISTE, have established necessary standards for learning, leading, and teaching in the digital age. Since technology affords educators and students the tools to meet the aforementioned elements for 21st century learning, ISTE Standards (2000) cited its importance as a necessary tool for “improving higher-order thinking skills, preparing students for their future in a competitive global job market, designing student-centered, project-based, and online learning environments, and inspiring digital age professional models for working, collaborating, and decision making” (“Why are standards important?” section). More information regarding ISTE’s National Educational Technology Standards (NETS) set for students and for teachers will be addressed in the next section of the review of literature, Teaching and Learning with

Technology, and referenced in the Appendices.

Building 21st century competencies, such as those outlined by P21 (2003), involves understanding the expectations for those in the current workforce, recognizing trends in essential 21st century skills, and using that information in order to predict what the future-ready child must be able to know and do. Author, instructional expert, and blogger Richardson (2008) described what this entails, asserting that our kids' futures will require them to be collaborative, networked, more globally aware, less paper dependent, more active, and creators, editors, and consumers of content. This glimpse into the world of the future-ready child allows educators to consider opportunities for learning not just new educational content but also new modes of thinking, creating, and communicating. Technology can be leveraged to meet these requirements and ensure the competence of learners today, tomorrow, and beyond.

We are witnessing our world changing rapidly, yet the progression into skill-building and outcomes for the future-ready child is happening much more slowly (Darling-Hammond, 2010). While the U.S. education system has yet to embrace the essential elements for preparedness, the need to do so is growing ever more apparent based on organizations that are rising to the challenge of bringing 21st century learning to the forefront. Jacobs (2010) said, "What has changed is the knowledge base, which has grown, and the tools for communicating and sharing what students are learning as they cultivate these skills in a new world" (p. 27). These 21st century tools and their various applications for teaching and learning narrow the gap between our present and future states.

Teaching and Learning with Technology

Providing the future-ready child with 21st century learning opportunities involves

the employment of technology as a tool for teaching and learning. In response to our changing world, the U.S. Department of Education developed a National Education Plan, which recognizes the significant role technology plays in almost every aspect of daily life (National Education Plan, 2010). The plan stresses the need for technology as a tool for future-ready preparedness.

How we need to learn includes using the technology that professionals in various disciplines use. Professionals routinely use the Web and tools, such as wikis, blogs, and digital content for the research, collaboration, and communication demanded in their jobs. They gather data and analyze the data using inquiry and visualization tools. They use graphical and 3D modeling tools for design. For students, using these real-world tools creates learning opportunities that allow them to grapple with real-world problems—opportunities that prepare them to be more productive members of a globally competitive workforce. (National Education Plan, 2010, p. xi)

While the future of today's learners is unpredictable, the U.S. Department of Education understands the role of technology as a tool in the lives of all citizens as well as the urgency with which our schools must build a strong knowledge base of current technologies.

The National Education Plan (2010) also called for the leveraging of technology in order to “provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways” (p. ix). It also attributed technology with providing educators with the collaborative tools and teaching strategies that enhance their proficiency and competencies throughout their careers. In order to establish and improve best practices

for instructional technology integration, the plan stresses the need for the implementation of new research and development, merging existing and developing technology innovations to promote 21st century learning. This plan provided a blueprint for improving the educational opportunities for the future-ready child based on the work of education researchers and practitioners who all site the various assets of instructional technology integration.

Another advantage to technology utilization mentioned in the National Education Plan (2010) is its ability to promote lifelong learning for students.

A key enabler of continuous and lifelong learning is technology. Technology gives learners direct access to learning and to the building blocks of their knowledge—organized, indexed, and available 24/7. This empowers learners to take control of and personalize their learning. Technology also can serve as a bridge across formal (in school) and informal (outside school) learning settings (Barron, 2006), creating new opportunities to leverage informal learning by integrating it purposefully into the fabric of formal learning. Technology also provides ways to ensure that as students pursue self-directed and informal learning they are still guided by professional educators. (National Education Plan, 2010, p. 18)

The ideal of fostering lifelong learning in the future-ready child provides sound reasoning for encouraging technology integration for all learners.

The multiple benefits of instructional technology use in the classroom make the case for improved likelihood of its acquisition and encouraged thoughtful integration.

Jacobs (2010) discussed how 21st century tools are advantageous to learners by

providing a visual and organizational tool that enables them to make meaning in

“concrete” ways, developing a different kind of ‘thinking tool’ helps them develop their critical thinking in far more ways, increasing engagement because of immediate excitement, control, and interactivity, allowing transfer of engagement into other aspects of the curriculum, increasing classroom teaching and learning when intrusive routines can be minimized, increasing the likelihood of completion of academic work during out-of-school time. (p. 22)

Jacobs continued by explaining the need for commitment by stakeholders in education to “replace existing practices” in order for students to reap said benefits (p. 22).

Apple published a whitepaper titled “The Digital Promise: Transforming Learning with Innovative Uses of Technology” (Wellings & Levine, 2009) that summarized the educational benefits of technology use as evidenced in the research of various organizations. When technology is “integrated deliberately and comprehensively into teaching and learning” (Wellings & Levine, 2009, pp. 3-4), the benefits include supporting student achievement, building 21st century skills, engaging students in both learning and content creation, increasing the access to education, virtual communities, and expertise, fostering inclusion, helping prevent dropouts, facilitating differentiated instruction, empowering learning and research in critical STEM fields, strengthening career and technical education, extending the learning day, improving teacher quality, and enabling diagnostic, timely, and innovative assessments (Wellings & Levine, 2009). While these benefits seem to make technology as a tool in our schools ubiquitous, an important consideration is how and when the tools are integrated. Instructional technologies are no magic wand to wave over classrooms full of students and transform them into 21st century learning environments; however, when proper access, appropriate tools, and adequate support are given to teachers and students, the future-ready child can

find some measure of success in the global economy and become a lifelong learner.

The Digital Disconnect

Despite the multitude of advantages to technology use in the classroom, there are still barriers that make effective integration possible. One such limitation has been the gap between the haves and the have-nots where technological access is concerned, which is known as the digital divide (Munkittrick, n.d.). The acknowledgement of this divide and its impact on society has led to increased financial support at both the federal and state levels. Bridging the divide will hopefully continue to lead to improved digital equity among all students, thus providing all learners with the 21st century tools necessary to be successful members of a global economy. In a new digital era in which there exists a growing popularity of mobile devices, BYOD has helped supplement a deficient amount of technologies that are now readily available for use in the classroom if school districts allow. Educational benefits and positive classroom management changes have been cited as observed effects from districts taking on BYOD (Devaney, 2011). Moves such as these to break financial and accessibility barriers have lessened the digital divide.

What limitation hinders us now is a wide gap in knowledge and usage of technologies. According to the most recent Speak Up Survey of both teachers and students, “Students come to school media savvy, but their teachers are ill prepared to put new media tools and technology to use, thus creating what the survey called a growing ‘digital disconnect’”(Jacobs, 2010, p. 134). Prensky (2001) coined the terms “digital natives” to refer to today’s learners and “digital immigrants” for those not born into today’s digital world. He likened teachers and learners to peoples’ first and second language fluencies. Prensky explained that today’s students are all native speakers of the

digital language, being entrenched in computers, video games, and the Internet ubiquitously from an early age. While the digital native is fluent in technologies, finding him/herself fully immersed and comfortable online, the digital immigrant struggles to understand, as if cast into a foreign country without fluency in the native language of that country. The digital immigrant constantly battles his own “accent,” with his own native background of technology being new and different from what he’s used to experiencing (Prensky, 2001).

How does this disconnect, which seemingly equates to a mere generational gap, have such a large impact on teaching and learning? It largely relates to what digital natives form so easily – live connected in our world.

Unlike most Digital Immigrants, Digital Natives live much of their lives online, without distinguishing between online and offline. Instead of thinking of their digital identity and their real-space identity as separate things, they just have an identity . . . They are joined by a common set of practices, including the amount of time they spend using digital technologies, their tendency to multitask, their tendency to express themselves and to relate to one another in ways mediated by digital technologies, and their pattern of using the technologies to access and use information and create new knowledge and art forms. (Palfrey, & Gasser, 2008, p. 4)

With the growing ability levels of our students, the digital natives, it is the responsibility of the teachers, the digital immigrants, to develop their digital skills, increase their online presence for educational purposes, improve their fluency in technology, and consequently narrow the digital disconnect with the seamless integration of technologies in the classroom.

The Role of Teachers in Technology Integration

The job of the teacher has always been a difficult one. Now, as expectations for educating the future-ready child evolve, so must the role of the teacher in the classroom. A 21st century classroom is expected to be student-centered, reforming the traditional view of the teacher as lecturer and keeper of knowledge into that of a facilitator. Instructional technologies now allow students to take ownership in their learning, relying on the teacher as a guide but only one resource available to them. In its National Education Plan (2010), the U.S. Department of Education stated that

[t]echnology should be leveraged to provide access to more learning resources than are available in classrooms and connections to a wider set of ‘educators,’ including teachers, parents, experts, and mentors outside the classroom. It also should be used to enable 24/7 and lifelong learning. (“Learning: Engage and Empower” section)

Consequently, teachers are responsible for selecting and implementing the appropriate, available technologies to support student-centered learning opportunities both in and out of the classroom setting.

The National Education Plan (2010) also outlined a vision for transforming classrooms into a 21st century model of instruction:

In contrast to traditional classroom instruction, which often consists of a single educator transmitting the same information to all learners in the same way, the model puts students at the center and empowers them to take control of their own learning by providing flexibility on several dimensions. A core set of standards-based concepts and competencies form the basis of what all students should learn, but beyond that students and educators have options for engaging in learning:

large groups, small groups, and activities tailored to individual goals, needs, and interests. (p. x)

Engaging today's learners requires continuous adjustments to match the needs of students, encouraging teachers to leverage technology for personalizing, individualizing, and differentiating instruction while employing a variety of teaching methods.

Educational technology can promote such student engagement by helping teachers shift to a student-centered classroom for future-ready teaching and learning. Christensen, Horn, and Johnson (2008) explained that as the shift to student-centered instruction including the use of technology replaces the traditional classroom approach, the role of teachers will gradually shift as well. This shift will be contingent upon teachers developing and implementing lessons that include the appropriate integration of technologies, bringing educational technology to the forefront.

The gradual transformation into 21st century classrooms requires teachers to embrace student-centered methodologies, i.e., project-based learning. These new methods promote student collaboration, make learning authentic, encourage problem solving, and connect with the community (Rotherham & Willingham, 2009), which are essential skills for the future-ready child. Despite wide acclaim and published research on these approaches, teachers typically do not employ them in their classrooms (Rotherham & Willingham, 2009). Reports such as that of the National Institute of Child Health and Human Development Early Child Care Research Network (2005) indicated that the majority of classroom time is spent through teacher-led instruction (lecturing) and independent seat work (as cited by Rotherham & Willingham, 2009). When measures are taken to improve the likelihood of using student-centered methods, i.e., the reduction of class sizes, teachers have not been found to adapt their teaching strategies

(Rotherham & Willingham, 2009). Classroom teachers of today's learners must break from the traditional methodologies by which they were taught in order to better meet future-ready learners' needs.

Teachers must design instruction for the future-ready child that integrates technology in content delivery and student output. The 21st century teacher's pedagogy should include the technologies needed for skill-building in the areas of communication, collaboration, problem solving, and interpersonal abilities: the key competencies identified by P21. The 2011 National Educational Technology Trends report indicated that the highly effective teacher employs innovative teaching approaches in conjunction with technology as a tool in order to best support student learning (Jones, Fox, & Levine, 2011). Ertmer (2005) referenced the research findings by Becker (2000a):

Computers serve as a “valuable and well-functioning instructional tool” (p. 29) in schools and classrooms in which teachers: (a) have convenient access, (b) are adequately prepared, (c) have some freedom in the curriculum, and (d) hold personal beliefs aligned with a constructivist pedagogy. (p. 29)

These and other factors are noted by various researchers as significant influences in the choices teachers make regarding technology integration in the classroom. Certain psychological variables (i.e., cognitive style, personality, and self-efficacy) can influence technology acceptance as well (Alavi & Joachimsthaler, 1992). What typically impacts instructional technology integration is the same as with what impacts many factors of student learning – the teacher.

Factors Impacting Technology Integration

When teachers have access to technology, they are charged with making choices about how they will capitalize on it for the purpose of enhancing the learning experiences

of students. These choices are found to be based on many factors as noted by the literature. The researcher in this study categorized these factors as follows: (a) the types of use of the technologies available; (b) the frequency of technology use in the classroom; (c) teachers' self-efficacy, beliefs, and attitudes about technology; and (d) the support and leadership provided for user. These categories emerged as reoccurring themes throughout the research of literature regarding technology integration in the classroom.

Type of Technology Use

Teachers' lesson planning and implementation involve a specific, educated decision-making process guided by curricular objectives as well as students' wants, needs, ability levels, and readiness for learning. Careful consideration must be taken in developing meaningful, real-world tasks in which students apply knowledge. Constructing and presenting lessons for the future-ready child require teacher evaluation of the 21st century tools available that match the students and the goals for learning. This complex process of evaluating tools is necessary to providing rigorous and relevant learning opportunities. What negatively affects the value of the tools is when all emphasis is placed on the tools, such as technologies, instead of on the deliberate implementation of those tools.

Technologies, however, should not be simply viewed as mere tools, despite that the term is used quite frequently in educational literature. The infusion of technologies in classroom instruction demands a shift in thought about what teachers know and believe about pedagogy, thus transforming the applications of instructional technologies from add-on options to vital lesson components. In the Tech&Learning online article, the author stated that

[m]uch of this infusion is just about continuing on with current practice and

sprinkling technology on top and calling it innovative. This is when it's just a tool. When the technology transforms the way we learn, offers us new, uncharted experiences and opportunities, it's much more than a tool but a whole new environment. (Shareski, 2011, para 4)

Technologies can be transformative in the teaching and learning process if properly approached and utilized. Blake (2008) relayed that technology is both “theoretically and methodologically neutral” (p. 12), as fundamentally, technology holds no claim in any specific teaching model or methodology; instead, the use of technology – “its particular culture of practice--is not neutral; it responds to what practitioners understand or believe to be true about [learning]” (p. 13). So the focus is not the tool itself but how that tool can be used to facilitate learning.

The types of technological tools chosen are sometimes selected for use without thought of purpose, need, or relevance to instruction. Since technology affords teachers a wide variety of tools, the appropriateness and fit of the instructional technologies selected must be considered. In some cases, teachers present technology for the sake of using it.

Teachers inexperienced in using technology often harbor that merely transforming an activity into a web or [technology-enhanced] format will guarantee its success for students . . . [A]ny activity without adequate pedagogical planning – technologically enhanced or not – will produce unsatisfactory results with students, even if it's attractive from a multimedia point of view (e.g., colors, graphics, photos, video, sound). (Blake, 2008, p. 14)

Ormiston (2011) warned of technology use for entertainment as opposed to realizing the true potential for it, which is to actively engage learners in new, collaborative ways. Not using it with intent and instructional purposes cheapens its use and lessens its potential.

The superficial use of instructional technologies will not transform classrooms into 21st century learning environments, and thus, neither teachers nor learners will reap the benefits so widely attributed to their successful implementation.

Using technologies just for the sake of using them, and thus transcribing the learning material from one medium to another, is not a matter of bad vs. good use, but an inappropriate, and if you want, an ugly, use (misuse) of learning technologies. (Dror, n.d., p. 222)

Instructional technologies open new doors for the future-ready child, affording them the abilities to quickly sift through vast amounts of information available to them 24/7 and to collaborate easily on shared content (Ferriter, n.d.). The key is for teachers as instructional leaders to select tools that align with the specific skills that they plan to develop with their students (Ferriter, n.d.). Students sitting in technology-rich classrooms, equipped with the newest, highly rated technologies but staffed by teachers who are incapable of integrating those tools are possibly experiencing the same types of learning opportunities as their classmates sitting in unplugged classrooms (Ferriter, n.d.).

Frequency of Technology Use

The teachers' choice of which technologies to utilize is important in the lesson planning and implementation process, yet other crucial decisions must be made as far as timing goes. Teachers must decide when to employ the available technologies and how often they must be used in order to be effective tools. Their use in isolation is superficial integration. Grunwald and Associates (2010) studied the perceptions of 1,000 U.S. K-12 teachers and administrators regarding the connectedness of technology and 21st century skills. They reported that

[t]eachers who use technology frequently to support learning in their classrooms

report greater benefits to student learning, engagement and skills from technology than teachers who spend less time using technology to support learning. Teachers who are frequent technology users also put more emphasis on 21st century skills—and report more pronounced effects on student learning of these skills.

(Grunwald & Associates, 2010, p. 6)

The 2010 study also noted from its survey results that there is a large discrepancy in the amount of class time spent using technology to support student learning.

Researchers of the study categorized technology usage as follows:

- Frequent users spend 31% or more of their class time using technology to support learning.
- Moderate users spend 21% to 30% of their class time using technology to support learning.
- Sporadic users spend 11% to 20% of their class time using technology to support learning.
- Infrequent users spend 10% or less of their class time using technology to support learning.

With these categories considered in data analysis, the data show that one in five teachers (22%) are frequent users, 17% are moderate users, 26% are sporadic users, and the majority of teachers (34%) are infrequent users. The results indicate that access to instructional technologies does not ensure their use. Many infrequent users surveyed feel that these tools are not necessary for their lessons. Meanwhile, the frequent technology users “place considerably more emphasis on developing students’ 21st century skills – specifically, skills in accountability, collaboration, communication, creativity, critical thinking, ethics, global awareness, innovation, leadership, problem solving, productivity

and self-direction” (Grunwald & Associates, 2010, p. 15).

Other studies demonstrate infrequency in use of instructional technologies by teachers. Cuban (2001) conducted his research to explore technology use in the classroom. He found that teachers used technology infrequently and mostly for the purpose of productivity. Cuban concluded that “less than 5 percent of teachers integrated computer technology into their curriculum and instructional routines” (p. 133), reporting that “the overwhelming majority of teachers employed the technology to sustain existing patterns of teaching rather than to innovate” (p. 133). While the use of instructional technologies should seamlessly fit within lesson planning and implementation, the frequency of their use by teachers can also impact successful integration.

Frequency of use is a determining factor in successful technology integration in the classroom to support student-centered learning. Kozma (1991) reported that researchers repeatedly call for students to have access to computers more than once or twice a week in order for technology to powerfully impact student learning. Many schools may not have enough computer labs to support all students receiving adequate time for technology use. Teachers have reported to researchers that when the technology is located on campus in labs, scheduling time and transporting students deter their use of technology (Adelman et al., 2002). In 1:1 environments, these factors are not a hinderance, as students and teachers have just-in-time, ready access to the technology, thus promoting frequent use of devices to support learning on campus.

Teachers and Technology: Self-Efficacy, Beliefs, and Attitudes

Other factors influencing teachers’ technology integration that are evidenced in the literature deal with individual psychological variables, including but not limited to self-efficacy, beliefs, and attitudes where technology is concerned. It seems a logical

conclusion that if teachers do not understand or feel comfortable with technology, they will not utilize it as an instructional tool. Teachers' self-efficacy, or how teachers perceive their own technological abilities, can determine their means of comfortably and successfully executing the implementation of instructional technologies within their lessons. Perceived self-efficacy, as described by social cognitive theorist Bandura (1997), is the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Bandura's research, along with the literature to support it, indicates that self-efficacy beliefs are powerful predictors of human behavior due to their "explicitly self-referent in nature and directed toward perceived abilities given specific tasks" (Henson, 2001, p. 3). He observed that people "regulate their level and distribution of effort in accordance with the effects they expect their actions to have. As a result, their behavior is better predicted from their beliefs than from the actual consequences of their actions" (Bandura, 1997, p. 129).

In the field of Education, Bandura's work has led to findings that self-efficacy is best evaluated contextually with respect to specific behaviors (Pajares, 1996). Self-efficacy has been suggested as a deciding factor in teachers' effective use of instructional technologies (Albion, 2001). Zhao and Frank (2002) asserted that teachers' pedagogical beliefs and their teaching practices are also factors that seem to govern their uses of technology (Becker, 2000a, 2000b; Hadley & Sheingold, 1993; Sandholtz, Ringstaff, & Dwyer, 1997; Zhao & Cziko, 2001, as cited by Zhao & Frank, 2002).

Each teacher's beliefs about his/her own pedagogy and technology's influential role in it are formed over years of study and classroom experience, making each as singular as the next. Albion (1999) cited Osborne and Gilbert's assertion that "all teachers have views of learning, which are implicit in their practices, but are rarely

articulated, even to themselves” (para 2). In describing the change process, Fullan (2001) attributed teacher understanding and subsequent buy-in for the true adoption of an innovation to occur. He suggested that shifts in both teachers’ perceptions and their behaviors must precede any real change (Fullan, 2001). The research of Honey and Moeller (1990, as cited by Koc, 2005) determined that successful models of technology integration are witnessed in classrooms in which teachers’ pedagogical beliefs shifted from teacher-centered to student-centered. They found that the more difficult adoption of technology integration occurred in the classrooms of teachers with more traditional beliefs. The study referenced earlier by Grunwald and Associates (2010) reported that frequent technology users perceive its positive effects on student learning as well as on student behavior. Professional and philosophical growth through teacher buy-in, understanding, pedagogical shifts, and a positive self-efficacy promote successful integration of instructional technologies.

Support for Use

As with many innovations, leadership and support can play a huge role in adopting and adapting to change. Teachers must have a clear understanding of and participation in the vision of any new initiative. This can help establish a successful model of cultural change, thus acting as a catalyst for transformation in teachers’ beliefs and self-efficacy. Largely, this is established through effective communication within the school culture and relevant, ongoing, and timely professional development. Tyack and Cuban (1995) urged for teacher participation in the technological shift: “whether teachers will embrace this new technology depends in good part on the ability of technologically minded reformers to understand the realities of the classroom and to enlist teachers as collaborators rather than regarding them as obstacles to progress” (p. 126). It is the role

of leadership to ensure that teacher buy-in can be made a reality in order to build a sense of community and collective involvement.

Another support necessary for assisting the implementation of technology integration is professional development. Rotherham and Willingham (2009) advised that teachers need much more relevant and robust training and support, including instructional strategies that address high cognitive demands as well as student-centric classroom management issues. The National Education Plan (2010) called for the replacement of episodic and ineffective professional development . . . by professional learning that is collaborative, coherent, and continuous and that blends more effective in-person courses and workshops with the expanded opportunities, immediacy, and convenience enabled by online environments full of resources and opportunities for collaboration. (p. xii)

Constructing a professional community of teachers as lifelong learners can help schools avoid putting the technological cart before the pedagogical horse by building teachers' understanding of changing their professional practices (Schlager & Fusco, 2003).

Technology itself can provide the means for realizing effective professional development while improving teacher self-efficacy in technology use. In "The Digital Promise," a variety of technology tools allow teachers and administrators to network, "such as school-based forum discussions, online professional networks, web-based collaborative documents, and video libraries of best practices can enhance professional development programs by giving teachers ongoing opportunities to explore successful practices" (Wellings & Levine, 2009, p. 8). Teachers need the opportunity to acquire new skills, try them with students, and reflect on the results within a professional learning community (Wellings & Levine, 2009). "Instead of sending teachers to an out-of-

context, two-day seminar during the summer break, technology-enhanced professional development programs can be embedded in practice throughout the school year” (Wellings & Levine, 2009, p. 8). Establishing a community of growth in which relevant, ongoing professional development promotes improved self-efficacy can effectuate teacher change and thus allow for better instructional technology integration over time.

Summation of Factors Influencing Technology Integration

In the past, teachers feared technology because of the potential threat to their job security. Some teachers resisted technological innovations because they felt that these might become more influential and successful in the teaching and learning environment. Clifford (1987) questioned,

Will technology expand in the future from this contemporary role to replacing the teacher and the classroom venue completely? A rational response to this question might be that technology will not replace teachers in the future, but rather teachers who use technology will probably replace teachers that don't. (as cited by Blake, 2008, p. 14)

For technology use by teachers to have any positive impact on the future-ready child, teachers must understand their own pedagogical beliefs as they relate to technology. Teachers' perceived self-efficacy must also be addressed by providing leadership and support to them in an effort to produce confidence and consequential utilization. Thoughtful lesson planning and implementation with the appropriate placement of 21st century tools can enhance the learning experiences of students if done so with frequency. Teachers must ultimately adapt their methodologies to promote 21st century learning with instructional technologies that match their teaching strategies, curricular goals, and students.

1:1 Computing

The rise in popularity of instructional technologies over several decades is slowly changing our approaches toward and beliefs about teaching and learning. Utilizing technology to foster a student-centered learning environment for the future-ready child requires financial support, leadership, and pedagogical adaptations. In an effort to bridge the digital divide and provide equal access to technologies, school districts around the globe are adopting 1:1 technology-enhanced learning initiatives in which students have their own daily access to at least one device to use during the school day and, if possible, beyond (Chan et al., 2006). Gateway (Underwritten by Gateway, 2005) defined 1:1 computing as “anytime, anywhere technology for every student” (p. 1). 1:1 initiatives “facilitate the transition in schools from occasional, supplemental use of computers for instruction to more frequent, integral use of technology across a multitude of settings” (Underwritten by Gateway, 2005, p. 1). As technology evolves, the devices used in 1:1 initiatives change, requiring continuing research and reflection on the impact of them on teaching and learning.

Apple Computers, Inc. began the first 1:1 project known as Apple’s Classrooms of Tomorrow in 1985 (Dwyer, Ringstaff, & Sandholz, n.d.). In the first program, there was a 1:1 ratio of desktop computers to students, giving each learner access to a computer on which to complete in-class tasks. The on-site limitation for 1:1 access was noted by teachers and students (Dwyer et al., n.d.). Once computer technology evolved into laptops, more advantages emerged, and students and teachers began connecting outside the classroom setting as well (Dwyer et al., n.d.). Today, the ubiquitous nature of mobile devices (i.e., tablet computers, iPods, iPads, and cell phones) has begun to transform what, how, and when we learn. To maximize their usefulness, we must “fundamentally

rethink our approaches to learning and education—and our ideas of how new technologies can support them” (Resnick, n.d., p. 32).

Impact of 1:1 Computing on Teaching and Learning

As discussed earlier, the literature surrounding technology’s impact on teaching and learning is plentiful. Various research reports to be discussed here will indicate 1:1 computing’s effect as well. The ratio of the technology to the learner changes the game for both teachers and students as a result of constant access to digital material, communication tools, productivity applications, and wireless research capabilities. Advocates and opponents of educational technology alike disagree with computers being shared resources in schools (Bebell & Kay, 2010). Beyond what we currently know of technology’s promises to education, we now discover those of the 1:1 technology-enhanced teaching and learning.

Advantages of 1:1 Computing

Examining the 1:1 computing initiatives currently in progress reveals certain advantages that have emerged. Warschauer’s (2006) research indicated five good reasons why schools should implement 1:1 computing initiatives: 21st century learning skills, greater engagement through multimedia, more and better writing, deeper learning, and easier integration of technology into instruction. He observed the future-ready child in his/her best environment: “Students in the schools we visited had plentiful resources and data at their fingertips; they learned to access that information, analyze and critique it, and work it into a wide variety of authentic products” (Warschauer, 2006, p. 2). These essential skills are included in the P21 framework for 21st century learning. He also cited the use of multimedia in student tasks that resulted in more engagement in the classroom. He explained,

Working with multimedia on a daily basis in school creates higher levels of student engagement—and engaged students spend more time on task, work more independently, enjoy learning more, and take part in a greater variety of learning activities at school and at home. Students in laptop programs also learn to produce and interpret multimodal content, a valuable skill in today's world.

(Warschauer, 2006, p. 2)

Immersing students in digital media in order to meet curricular goals seems logical, given that students today live in a 24/7 multimedia world.

Warschauer's (2006) research also attributed the 1:1 laptop initiatives with increased and improved writing by students. He cited Reeves (2002) on how a school-wide emphasis on improving writing skills transfers to overall high student achievement (Warschauer, 2006). In low-tech classrooms, often time and attention for writing is lacking; in 1:1 settings, students write more than those in traditional settings. They have continuous access to the productivity applications through which they develop and revise their writing (Warschauer, 2006). The digital format of their writing and the automated scoring programs afford their teachers with more time and easier access to provide prompt feedback for students on their writing (Warschauer, 2006).

Another advantage of 1:1 initiatives is a sense of deeper learning (Warschauer, 2006). Students have the constant access and multiple modes to attaining the same material, which give them more freedom of choice in project-based learning activities (Warschauer, 2006). Warschauer (2006) stated, "Nearly all the schools we visited reported a greater emphasis on in-depth student research than before" (p. 2). This also relates to student engagement in 21st century learning environments.

Students need and want to be engaged in their learning. Engagement for today's

learner is tied to choice, clear expectations, relevant and meaningful curriculum, opportunities for teamwork, communication, cooperation and collaboration with peers and their teachers, being part of the decision-making process, multi-sensory interactive environments, personalization options, and use of a variety of appropriate technologies. (Learning Cultures Consulting, Inc., 2006, p. 5)

Engagement and enthusiasm were expressed also by the teachers of Warschauer's (2006) 1:1 research. Teachers who participated in surveys and interviews were unanimously enthusiastic about how easily and naturally they were able to integrate the laptops into learning tasks for the students (Warschauer, 2006). The teachers discussed how the easy access for every student provided them with more time to focus on content, spending less class time on delayed access to 21st century tools (Warschauer, 2006). Teachers found themselves freed up from training the students on the how the technology worked as students' technical skills improved over time, given their frequent use of the laptops (Warschauer, 2006). As mentioned earlier, these factors influence teachers' integration of instructional technologies. It can be deduced that 1:1 initiatives allot the right conditions for a more positive perceived self-efficacy for those teaching in 1:1 environments.

Other advantages to learners that were not discussed in Warschauer's (2006) 1:1 research deal with the varied cognitive abilities of each student. With 1:1 access, teachers can plan and implement their lessons while differentiating and personalizing for individual students' wants, needs, ability levels, and learning styles. In an interview with former educator and CEO of Powerful Learning Practice Sheryl Nussbaum-Beach, she detailed the use of technology as part of a personalized learning approach:

Whenever you use a one-size-fits-all assessment or instructional approach, some

people are going to be allowed to work through their strengths, and others are going to have to approach that objective through their weaknesses. The potential to have students work from their strengths really comes alive in the 21st century because new technologies and Web tools allow us to manage and express knowledge and information in many different ways. (Norton, 2011, para 11)

Christensen et al. (2008) also relayed that teachers should employ differentiation in order to afford students of all cognitive abilities to find success in their individual strengths while building other skills. Instructional technology allows teachers to make more personalized instructional choices, catering to the wants, needs, and skills of their students and consequently building a student-centric learning environment (Christensen et al., 2008). Teachers can plan and instruct lessons with variations that will serve specific students with the assistance of technology, particularly with 1:1 access.

Disadvantages and Barriers of 1:1 Computing

As with any new initiatives in schools, the factors impacting successful implementation rely heavily on those related to teachers' and administrators' roles in the initiative. Without leadership and support, a positive self-efficacy, an understanding of the initiative and its purpose, and an open-mindedness regarding change, new technological initiatives are doomed to failure, whether or not the access ratio is 1:1.

Warschauer's (2006) review of 1:1 programs led him to explain the wrong motivations to adopt this type of initiative, including higher test scores, reform of troubled schools, and erasure of achievement gaps. While some school districts aim to combat these three major issues constantly, Warschauer contended that investing time and resources into a 1:1 computing initiative is no guaranteed fix of those issues.

Despite certain exceptions to the rule, generally 1:1 laptop programs have been

ineffective in raising test scores. Warschauer (2006) provided evidence of this by referencing the two most notable initiatives in the states, Maine and California, whose achievement scores did not yield the results that were expected. He equated the disappointing test scores with the assessment format (pencil and paper) and with the infancy of laptop programs, as “almost any technological innovation takes a number of years to have a full impact” (Warschauer, 2006, p. 1). He also stated that 1:1 programs amplify what is already in a school.

Whatever a school is doing well, it can probably do better with laptops. By the same token, though, if a school is seriously troubled with discipline problems or unfocused instruction, laptops may amplify those difficulties by giving students a new means for off-task behavior and teachers a new tool for keeping students busy rather than teaching them. Laptops will make a good school better, but they won't make a bad school good. (Warschauer, 2006, p. 2)

With respect to bridging achievement gaps, 1:1 laptops are not assurance. “Learning with laptops can benefit all students, but don't count on laptop programs to erase education inequities in your district” (Warschauer, 2006, p. 2).

This researcher also notes that, as with all technologies, those selected for use in 1:1 environments are typically outdated by the time their effectiveness in the classroom is assessed and reported. Some districts have difficulty making informed decisions about the types of technologies in which they should invest funds. Often, they find themselves blindly making those decisions and then unable to develop a plan of action for appropriate implementation, give the time for adequate support, and encourage teacher buy-in to support the initiative. This building-the-plane-as-its-flown approach can result in a complete failure to launch. The need for continuous research, program piloting, data

collection, and data analysis is apparent. Districts must focus on their own needs, plan accordingly, and constantly reflect on their decisions.

Emerging Trends in 1:1 Programs

A 2010 literature review developed by Digital Education Revolution NSW outlined key implications of 1:1 laptop programs in schools. The One-to-One Computers in Schools 2010 Literature Review (Digital Education Revolution NSW, 2010) found that 1:1 programs can improve student learning as well as student achievement. It also suggested that professional development for staff is an essential part of successful integration of 1:1 programs, implying the need for ongoing work and support from leadership to empower teachers. According to the One-to-One Computers in Schools 2010 Literature Review, this ongoing professional development needs to focus on 1:1 technology pedagogy, not on technology proficiency, as well as reflective pedagogical practices, collaborative efforts, the sharing of resources and strategies, and discussions about implementation successes and failures. These learning opportunities are significant because they help shape teachers' pedagogical beliefs over time; their beliefs greatly inform the amount and type of integration within the classroom (Digital Education Revolution NSW, 2010).

The One-to-One Computers in Schools 2010 Literature Review (Digital Education Revolution NSW, 2010) connected teachers' pedagogical beliefs, practices, and successes in a 1:1 environment with leadership and support. The review found that “[s]chool leaders must build a shared vision, keep the focus on that vision, lead the planning, provide time for collaboration and discussion and provide appropriate and timely professional learning for teachers” (Digital Education Revolution NSW, 2010, p. 17). The school culture of a 1:1 school must promote collaboration; a shared, distributed

leadership; and a whole school approach in order to maximize effectiveness (Digital Education Revolution NSW, 2010). Leaders must also provide sufficient technology support for their teachers, as these needs will not diminish throughout the life of the 1:1 program (Digital Education Revolution NSW, 2010).

These implications can be true for any type of 1:1 initiative and should be considered in the programs' planning and implementation processes. 1:1 programs must be more than simply providing access to technology for each student and staff member. The trends outlined in the One-to-One Computers in Schools 2010 Literature Review (Digital Education Revolution NSW, 2010) show that pedagogy, support, and leadership are crucial elements that, if correctly balanced, can lead to improved teaching and learning in 1:1 schools.

The Evolution of 1:1 Devices: Learning Goes Mobile

Almost 3 decades ago, the chosen technology for 1:1 initiatives was the desktop computer which was quickly replaced by the laptop that provided all of the benefits of teaching and learning with technology along with the added bonus of mobility. The anytime, anywhere access to information and to productivity and communication tools made laptops very appealing to districts looking for instructional technologies on a 1:1 scale. Now, mobile learning devices, tablets, and smartphones in particular

enable ubiquitous access to information, social networks, tools for learning and productivity, and hundreds of thousands of custom applications. Mobiles were listed in previous years because they could capture multimedia, access the Internet, or geolocate. Now they are effectively specialized computers for the palm of your hand, with a huge and growing collection of software tools.

(Johnson, Adams, & Haywood, 2011, p. 6)

Teachers and administrators have distinct differences in their opinions regarding tablets and those regarding smartphones for use in the classroom. Essentially, smartphones are viewed as a disruption and classroom management nightmare while tablets offer some of the desirable tools of smartphones with the added bonus of a variety of tools geared for learning (Johnson et al., 2011).

Shuler (2009) looked at both positive and negative aspects of mobile learning (mLearning). She identified five key opportunities in mLearning: encouraging “anywhere, anytime” learning; reaching underserved children; improving 21st century social interactions; fitting with learning environments; and enabling personalization in learning (Shuler, 2009). These attributes of mLearning serve to make a case in support of it. mLearning encourages real-world learning in any context; helps bridge the digital divide with its low cost access; fosters communication and collaboration among students and teachers; fits more seamlessly into learning environments; and supports differentiation, individualization, and learner autonomy (Shuler, 2009).

Shuler (2009) also described five challenges of mobile learning: negative aspects of mobile learning, cultural norms and attitudes, a lack of a mobile theory of learning, differentiated access and technology, and limiting physical attributes. She recognized that “[c]ognitive, social, and physical challenges must be surmounted when mobile devices are incorporated into children’s learning. Disadvantages include: the potential for distraction or unethical behavior; physical health concerns; and data privacy issues” (Shuler, 2009, p. 6). The perspectives of some educators are that mobile devices are merely a disruption to learning and hold no real value in schools (Shuler, 2009). A lack of a widely acknowledged theory of mLearning hinders the progression of pedagogy and of assessment in support of mobile technology use (Shuler, 2009). Also, the wide variety

of possible mLearning tools is a definite challenge for both teachers and learners who must select appropriate tools for learning outcomes (Shuler, 2009). Some of these devices are poorly designed for use in the classroom, thus ultimately serving as a distraction instead of an effective learning tool (Shuler, 2009).

Rethinking mLearning Devices: Apple's iPad

A tablet that shows great potential for mLearning is Apple's iPad. "iPads are a new type of technology tool that allows for many kinds of interactions with a connected communication device" (McCombs & Liu, 2011; Ostashewski, Reid & Ostashewski, 2011, as cited by Reid & Ostashewski, n.d., p. 1689). The iPad as an mLearning tool brings even more possibilities for teaching and learning than other mobile devices due its unique features, such as the textbook-size screen and thousands of apps developed for education (Watlington, 2011, as cited by Reid & Ostashewski, n.d.). Weighing a mere 1.44 pounds (Apple, n.d.a), the sleek and lightweight design of the iPad coupled with its large, high-resolution touch screen make it easily portable, visibly interesting and accessible, and uniquely tactile. The new iPad has a 10-hour battery life (Apple, n.d.a), making it 1:1 user-friendly throughout the school day and beyond.

Connectivity and access are critical for the future-ready child to allow for collaboration and communication. The iPad comes both Wi-Fi and Bluetooth ready, giving students the ability to wirelessly retrieve any web content, send and receive email messages, and connect without cables to other devices. While laptops and other mobile devices have these same features, the unique size and weight of the iPad make it ideal for anytime/anywhere learning online. If schools are ill-equipped with wireless access and a sound infrastructure, the new iPad can still connect using a 4G data plan which requires a contract with cell phone companies, i.e., Verizon, Sprint, and AT&T. Regardless, the

iPad is ready-made for connectivity and access.

The iPad was designed with accessibility for all learners in mind based on the built-in technical features available, including a VoiceOver screen reader, support for playback of closed-captioned content, an AssistiveTouch interface for adaptive accessories, full-screen zoom magnification, large fonts, white on black display, and left/right volume adjustment (Apple, n.d.a).

The iPad includes a VoiceOver screen reader controlled by gestures that make it easier to use for those who are blind or have impaired vision. VoiceOver is available in 36 different world languages and boasts an adjustable speaking rate option, allowing teachers and students to personalize the iPad to fit their needs (Apple, n.d.b). The iPad also makes it easier to use for those who are deaf or hard of hearing by providing closed captioning, mono audio, and visual notifications (Apple, n.d.b). Accessibility features of the iPad provide assisted learning for those with impaired physical or motor skills, including tactile buttons that are easy to press and AssistiveTouch that functions using Multi-Touch gestures of one finger (Apple, n.d.b).

The iPad presents the capabilities of serving as an audio and video recorder, with its built-in microphone, speakers, and two high-quality cameras (front and forward facing). The high definition video recording captures up to 30 frames per second with audio (Apple, n.d.a). There are eight built-in apps for audio and video recording, filing, and streaming, not counting the web browser app, Safari, and the multitude of audio video apps available on the App Store (Apple, n.d.a). This can be a multimedia dream for teachers and students, given the straight-out-of-the-box capabilities to utilize these features to both create and access digital audio and video content.

Apple also offers a variety of media for students and teachers. Books (iBooks)

and textbooks are available electronically both for creation and for download (paid and free versions). The multi-touch textbook presents interactive diagrams, 3D objects, videos, and photos, providing digital-rich material that can engage learners in a way that traditional textbooks cannot. Reading books in the iBooks app affords students annotation tools, allowing them to touch words on the iPad screen, highlight, take notes (which are converted into study cards), and search for content and definitions (Apple, n.d.c). Students and teachers can create their own interactive iBooks and textbooks using iBooks Author. iBooks Author is a free app available through the Mac App Store, which can be downloaded on an Apple computer and used for developing original iBooks themselves for reading on the iPad (Apple, n.d.c). All books and textbooks can now be accessed and annotated directly on the iPad, eliminating the weighed-down student backpacks of the past decades.

Instructional content can be organized and made available on Apple's iTunes U. Teachers at K-12 schools, universities, or colleges can use iTunes U in order to "design and distribute complete courses" (Apple, n.d.d). iTunes U course materials can include audio and video, presentations, documents, PDFs, iBooks textbooks for iPad, ePub books (iBooks or eBooks), iOS apps, and web links (Apple, n.d.d). These courses can be experienced interactively for free through the free iTunes U app on the iPad.

The appeal of the iPad also stems from its well over 200,000 apps that are available for the iPad via the App Store. The App Store has a variety of categories from which to shop, including Business, Education, Productivity, and Social Networking. The Education section has a wide variety of apps by subject area as well as for reference, communication, and productivity. The Joan Ganz Cooney Center conducted a content analysis of the Education category of Apple's App Store in order to understand mobile

apps, determine trends, and make market recommendations (Shuler, n.d.). The study concluded that “[a]pps are an important and growing medium for providing educational content to children, both in terms of their availability and popularity” (Shuler, n.d., p. 2). The findings indicated that more than 80% of the top selling paid apps in the Education category target children, a number that has risen in every age category (Shuler, n.d.). The report references the current “App Explosion,” in which the mobile app market has skyrocketed in revenue and app development. By 2015, it is estimated that mobile app revenue will generate \$38 billion. Apple seems to be leading the industry with over 500,000 apps available, whereas its leading competitor, Android, has over 300,000. Apple has also already paid app developers over \$2.5 billion total to continue developing apps for the iPad (Shuler, n.d.). Shuler (n.d.) also asserted that

the field is emerging so quickly that empirical studies on the effectiveness of apps for learning have lagged behind, and learning apps for mobile devices have become a hotly debated educational technology topic. What is not up for debate is that today’s children would benefit if apps become an important force for learning and discovery. (p. 3)

With respect to mobile devices for teaching and learning, Reid and Ostashevski (n.d.) concluded that the vastly superior features of the iPad to other mobile devices makes implementation in the classroom worth the effort. These mLearning tools could be the right combination of mobility, productivity, content delivery, and connectivity to meet the needs of the 21st century classroom (Reid & Ostashevski, n.d.). As the iPad continues to develop with teaching and learning in mind, it could become just the right device for 1:1 computing initiatives. Just as with any instructional technologies, we look to educators to determine the right fit for the future-ready child, prepare and implement

them appropriately, and use them with fidelity in the classroom in an effort to reap all of the benefits that their features can offer.

Summary of the Review

The literature around this study's theoretical framework reviewed the concepts of 21st century education, teaching and learning with technology, and 1:1 computing. The skills and outcomes essential to the future-ready child cannot be ignored as passing educational fads. "Our students are in the 21st century, and they are waiting for the teachers and curriculum to catch up" (Jacobs, 2010, p. 23). In a sense, we are futurists, and students are dependent upon us in the field of education to fully understand the current trends that will shape the way that their futures are designed. Predicting this future is a challenge that must be met to ensure the preparedness of the future-ready child.

It is evident that the employment of 21st century tools can facilitate meeting the needs of the future-ready child. Teaching and learning with technology will develop better communication and understanding between digital natives and digital immigrants, a divide that must be narrowed considerably. The teacher's role is critical to providing 21st century learning opportunities for all students. With respect to technology integration, the classroom teacher should work to develop his/her own technological abilities; plan and implement lessons thoughtfully with seamless integration of instructional technologies in mind; and refine and adjust his/her pedagogy and beliefs about technology in order to transition more easily into new approaches in the classroom.

As the technologies change, we must strive to comprehend their possible advantages and utilize their features with students to enhance learning opportunities. Initiatives such as 1:1 computing and mLearning force us to rapidly analyze how to best

leverage instructional technologies for the sake of the future-ready child. Evaluating new technologies and their potential impact on teaching and learning can bring classrooms into the 21st century, a transformation that has failed to happen even in some digital-rich environments. Discovering ways we can promote 21st century competencies must be a priority for practitioners today.

Chapter 3: Methodology

Introduction

With the future-ready child in mind, models of instructional technology integration in 1:1 settings are being developed to match the technologies available, to cater to the needs of the future-ready child, and to create 21st century learning environments. The review of the literature revealed the critical role of the teacher in the implementation process, yet insufficient studies of pedagogical shifts in 1:1 environments with mobile devices yield a void in research to support such initiatives in our schools. Many districts focus on student achievement data to provide a rationale for providing instructional technologies in the classroom, ignoring the significance of teachers' lesson planning and implementation with technological integration and of role of leadership in supporting teaching in initiatives by providing relevant, timely, and ongoing professional development opportunities. Understanding teachers' beliefs, self-efficacy, and instructional strategies where technology is concerned provides those in education with a lens through which to view what makes teaching and learning both possible and effective in 1:1 scenarios.

The purpose of this research was to study the teachers' perceptions of the possible impact of 1:1 iPad implementation at iElementary on teaching and learning. The questions around which the research was designed and conducted are as follows.

1. Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive?
2. Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation?
3. What shifts, if any, are observed in student engagement, student motivation,

and the development of 21st century skills in the future-ready child?

4. Based on the experience of iElementary teachers, which factors influence teacher self-efficacy?

The research design was chosen based on the nature of the problem, the setting of the study, and the research questions posed. A qualitative case study approach was appropriate for this research. Creswell (1998) defined a case study as “an in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection” (p. 485). Case study research is employed as a means of deeply understanding a real-life phenomenon (Yin, 2006). The inquiry of case study “copes with the technically distinctive situation in which there will be many more variables than data points” and “relies on multiple sources of evidence, with data needing to converge in a triangulating fashion” (Yin, 2006, p. 18). Case studies use multiple data to bring to light the viewpoints of different individuals (Tellis, 1997). A case study for this research served to discover whether or not any causal variables come to light that will promote future research in related studies in which initial research is insufficient or nonexistent.

This research did not seek to generalize the insights gleaned from specific numerical data but instead sought to explore the phenomenon at one specific setting through the perspectives of the participants. Therefore, this research was a single-case study. Single-case studies are “ideal for revelatory cases where an observer may have access to a phenomenon that was previously inaccessible. These studies can be holistic or embedded, the latter occurring when the same case study involves more than one unit of analysis” (Tellis, 1997, “Introduction” section, para. 1). The 1:1 initiative at iElementary was a unique phenomenon that was studied qualitatively.

Participants

The participants in this study were willing iTeachers (kindergarten to fifth-grade teachers) as well as iLeadership (administration and the instructional support team) at iElementary. iTeachers and iLeadership involved in this study must have been involved in the 1:1 iPad program at iElementary since year 1 of implementation. Participating iTeachers must have also taught at iElementary at least 1 year prior to year 1 of 1:1 implementation, including but not exclusive to the 2010-2011 school year. According to the staff information provided by the school, there were 21 total classroom teachers in Grades Kindergarten-5 at iElementary and five specialists leading instruction in the areas of art, guidance, math enrichment, music, and physical education. Other staff involved with student support included one media specialist, three Exceptional Children (EC) teachers, one ESL teacher, and one speech teacher. iElementary also had an Instructional Leadership Team of four members offering support in the areas of literacy, math, science, and technology. Along with the principal and one assistant principal, this team was part of what the research refers to as iLeadership. A total of 34 iTeachers and six members of iLeadership are currently placed at iElementary. Those meeting the research criteria detailed above were invited to participate in this study. This criterion sampling strategy matched the purpose of the study, related to the research questions, and met pedagogical considerations that were critical to this study. Criterion purposeful sampling is also considered useful for quality assurance in investigating a variety of perspectives from a single culture-sharing group (Creswell, 2007).

Procedures: Data Collection and Analysis

In order to determine iTeachers' perceptions and experiences during the 1:1 iPad initiative, the researcher adapted survey and interview questions that had been utilized in

other 1:1 studies. As 1:1 iPad initiatives and research surrounding them are fairly new, survey and interview questions were adapted to meet iOS technologies for this study. The procedural steps (Appendix A) detailed in this section were planned according to the nature of the problem and the research questions outlined in this research. The focus of data collection was to glean a better understanding of pedagogical adaptations in the classroom; of the possible perceived impact on lesson planning and implementation; of shifts in student engagement, motivation, and development of 21st century skills; and of factors influencing teacher self-efficacy.

The first step was to gather archival data that were collected during year 1 of implementation. Prior to beginning year 1, a survey was conducted in which iTeachers were asked to discuss the anticipated impact of the 1:1 iPad program at iElementary. This baseline assessment was utilized for the purpose of determining commonalities of iTeachers' attitudes toward and preconceptions about iPads as instructional aides in the teaching and learning process. Also, a summary report of focus group discussions and survey questions was generated in January 2012 via a local university. The principal of iElementary provided the researcher with a copy of the summary report for use in this study. The archival data served as a comparison of past perceptions of iTeachers with their current perceptions. This also allowed for triangulation of data, further verifying the validity of noted pedagogical shifts in the 1:1 initiative.

Step two of methodology was to conduct 1:1 surveys and interviews in order to gather survey items and interview queries related specifically to the research questions that could be adapted. As 1:1 iPad initiatives are fairly new, other questionnaires regarding 1:1 laptop initiatives were studied in consideration of their adaptation for the iPad initiative at iElementary. Alignment to the purpose of this study and the research

questions was crucial; therefore, survey items and interview questions had to be modified or discarded from original surveys and interviews obtained through research. Once questions were determined to be adaptable, permission was requested from the original researchers to adapt and use the survey items and interview questions. Permission was granted via email under the conditions that this researcher share the findings with the 1:1 researchers who generated the original questions in previous studies. Survey items and interview questions were then drafted for review.

In order to vet the survey items and interview questions, the researcher invited seven people to form a review committee. Choosing the committee involved purposeful selection of those with both educational and technological experience in the school district. Committee members were also chosen based on their knowledge and understanding of iElementary's staff and community members. Knowing the intended audience of surveys and interviews allowed committee members to validate the clarity of the survey in both language usage and layout. A document was developed for committee members to complete, including a cover sheet with the purpose of the study, research questions, and the rationale for eliciting committee participation. Instructions were provided for the members on the cover sheet asking that they carefully read all instructions and questions with iTeachers and iLeaders in mind and write any comments regarding each question on the attached printouts of the survey and interviews.

Committee members were again reminded of the research questions to be answered and the importance of providing the researcher with feedback about the connection between the purpose of this research and the questions to be edited for use accordingly. Of the seven committee members selected, six volunteered to participate. Those six committee members met individually with the researcher to discuss their ideas.

Based on their feedback, repetitive and insignificant questions were omitted, wording was changed to improve clarity of both instructions and questions, and secondary interview questions were proposed as follow-ups to certain queries in order to prepare the researcher for interviewing iElementary participants.

The final draft of the survey was then used to create an electronic form for future distribution to qualifying iTeachers. The survey was made as a form within Google Docs, a free online productivity tool made by Google. The online survey was sent in a hyperlink via email to those iTeachers meeting the criteria for this study. Survey results were then available to the researcher via Google Docs in the form of a spreadsheet. Individual results were emailed back to participants for review and clarification. Validation of responses from participants and clarification allowed the researcher to minimize inaccuracies in data analysis and interpretation (Creswell, Plano Clark, Gutmann, & Hanson, 2003). It also encouraged participants to be collaborative, valued members of the study (Kvale & Brinkman, 2008).

In the next step, the researcher input survey data into qualitative analysis software from Researchware, HyperRESEARCH, in order to begin organizing responses and looking for themes. The organization and review processes allowed the researcher to gain some prior knowledge of iTeachers' perceptions before conducting interviews (Kvale & Brinkman, 2008). Prior to conducting interviews, the researcher reevaluated the themes revealed in the analysis of survey responses and compared them to the original interpretation of themes from survey results. This allowed the researcher to reflect on the data throughout the analysis and collection processes, as typically done in ethnographical qualitative research (Hammersley & Atkinson, 1995).

After gleaned information about iTeachers' perceptions, the interview process

began. Both iTeachers and iLeaders were elicited for participation in the interview process, as responses were to further validate perceptions and provide the researcher with data to triangulate, demonstrating any possible discrepancies in perception versus reality. The researcher briefed the participants by providing them with interview protocol, a list of the questions, and the purpose of the study. This was done in an effort to ensure participant comfort with the interview, to adhere to research ethics, and ensure participant understanding of interview protocol. The researcher conducted and audio recorded the interviews, either in person or via telephone, based on the time and needs of the willing participants. At the end of each interview session, the researcher debriefed, giving participants the opportunity to share any other final thoughts (Kvale & Brinkman, 2008). The researcher transcribed the interviews using qualitative analysis software from Researchware, HyperTRANSCRIBE, cross-referencing the audio recordings to ensure accuracy. Emailed transcripts were sent to participants for review, approval, and possible changes. Again, this was to validate responses from participants while seeking clarification as needed in an effort to minimize inaccuracies in data analysis and interpretation (Creswell et al., 2003). This involvement and communication with participants also afforded them to be collaborative, valued members of the study (Kvale & Brinkman, 2008).

The researcher coded emerging themes that were found in the data. Organizing data in manageable, logical chunks facilitated interpretation and understanding of the data (Kvale & Brinkman, 2008). Emergent themes were restated and described, which also facilitated interpretation of themes for analyzation. The researcher reviewed and related themes to the research questions and the purpose of the study, aiding the interpretation of themes for analyzation under the framework of the study in order to best answer the

research questions. Examination and comparison of themes across interviews and survey results triangulated the data for validity and reliability. Next, the researcher found and recorded any possible similarities and patterns based on teacher variables (e.g., years of teaching experience, subject, or grade level taught) in order to understand any common ground in perceptions among participants in their unique environment. A comparison of the archival data and the researcher-collected data were studied for the purpose of revealing any differences and similarities in past perceptions to current perceptions, giving the researcher the opportunity to report if any changes existed. Using multiple sources of data further validated research findings (Yin, 1984).

Research Questions and Measurement Tools

Research of 1:1 program studies produced samples of surveys that were administered to participants in those studies. With the research questions of this study in mind, the researcher selected a variety of questions to be reviewed for possible inclusion in an adapted survey for iTeachers. Created electronically in Google Forms, the drafted online survey (Survey of iElementary Instructional Staff, Appendix B) began with the district's required rights and assurances, followed by the options of whether or not solicited participants would be willing to participate in this study. Participants selecting the option "I am not willing to participate in this research project," were sent directly to the final "Thank You" page of the survey. Those choosing instead to participate were moved through to the next section of the survey.

The survey was comprised of five sections: General Information; iElementary Technology Benchmarks; Teaching and Learning with iPads: Classroom Use; Self-Efficacy: Comfort Level with iPads; and Perspectives on the iPad. General Information provided nominal data for the researcher: subject area/grade level taught, years in service

in the district and at iElementary, and state and national teaching certification. This data served as a means for grouping the population by areas taught as well as to provide background information regarding teaching experience and qualification. The sections that followed pertained to the research questions to be answered in this study. Each section was aligned to the four research questions (see Appendix C).

iElementary Technology Benchmarks were developed preimplementation to be introduced during year 1 and actively evaluated by iLeadership beginning in year 2 of the initiative. The five technology benchmarks were available on iElementary's website. The researcher contacted a member of iLeadership via email to inquire about these benchmarks. iLeadership indicated that despite the original plan to utilize the benchmarks to measure technology integration in the classroom, the technology benchmarks were not used during year 1. These technology benchmarks were introduced to the staff midway through year 1, and iTeachers were asked to informally self-assess their level of technology use. In year 2, iLeadership began assessing the iTeachers on the five benchmarks through observations and artifacts collected in portfolios using a rubric. The iTeacher technology benchmarks rubric had four levels of performance, where level one was deficient and level four was exceptional. The rubric also included standards required within each of the five benchmark areas. Two of the five benchmarks related to this study were included in the first draft of the survey, Incorporation of 21st Century Skills and Project-based Learning and Technology Integration with iPad 2. Based on feedback from the review committee, questions from Technology Integration with iPad 2 most closely related to the research questions and were included in the final draft of the survey for distribution. An open-ended question was added following the Technology Integration with iPad 2 section, asking survey participants to "give details on [their]

efforts to meet Benchmark 3,” in an effort to give them a chance to share any additional information about their utilization of the iPad within the classroom.

As discussed in the Review of the Literature, the research revealed teachers’ self-efficacy as an indicator of both the frequency of technology use and the quality of lessons in which instructional technology is planned and implemented. There were survey questions regarding how often iTeachers perform tasks with the use of the iPad, ranging from Every Day to Never. iTeachers’ comfort levels with the iPad were self-assessed in the survey by rating several different tasks on the iPad, including the delivery of instruction, location of differentiated instructional resources, communication, creation of materials for student use, and exploration of educational apps and websites for teaching and learning. These survey questions related to Research Question 4: Based on the experience of the teachers, what factors influence teacher self-efficacy?

The researcher also aimed to determine iTeachers’ perspectives on the iPad through the use of survey questions. Using parts of two surveys, the Impact of Technology section of a survey created by the North Carolina Department of Public Instruction and the University of North Carolina at Greensboro and Bebell and Kay’s (2010) One to One Computing survey, iTeachers were asked to respond to a set of statements indicating whether or not they agreed with each. The statements to which they were to agree or disagree all reflected a positive perception of the use of the iPad as an instructional tool. How iTeachers chose to respond provided the researcher with data regarding how the iTeachers perceived the impact of teaching and learning with the iPad in a 1:1 scenario. An open-ended question was added after this section in an attempt to invite survey participants to give more observed areas of impact. This section related to Research Question 1: Throughout the 1:1 initiative, what pedagogical changes, if any, do

teachers perceive; Research Question 2: Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation; and to Research Question 3: What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child?

Interview questions for iTeachers and iLeadership (Appendices D and E, respectively) were adapted from Livingston's (2009) research on 1:1 Learning: Laptop Programs that Work and Foote's (2008) dissertation. The queries and follow-up questions were reviewed by the same committee of six who provided feedback regarding the clarity of language used as well as the alignment of the interview questions with the research questions for this study. Questions were selected to encourage open discourse on perceptions of the 1:1 initiative and to give further data to compare with that of the survey data. These data were to either support or invalidate iTeachers' perceptions as originally described through the completion of survey questions. iLeadership provided their insight into their perceptions based on observation of iTeachers' use of the iPad, either confirming or contradicting iTeachers' perceptions. The use of multiple sources of data and their triangulation afforded the researcher a better view into the phenomenon at iElementary.

Reliability and Validity

Qualitative researchers are charged with the task of demonstrating trustworthiness, transparency, and ethical standards in research. The data must be collected, analyzed, and reported in a valid, reliable manner. To ensure reliability and validity, this researcher employed several qualitative research strategies throughout the data collection, analysis, and reporting processes. Beginning with the review of the literature, the researcher chose the practice of reflexivity, the act of critical self-awareness

in an effort to eliminate predispositions that could impact processes and analysis, thus potentially altering the results (Watt, n.d.). The theoretical framework of this research developed organically throughout the review of the literature on 1:1 programs, instructional technology integration, and iPads in education. The researcher let the emerging studies and themes guide the research process, leading to a more open view of potential variations in findings. This open view allowed the researcher to be more aware of the perceptions of those involved in the 1:1 program at iElementary. Rich, descriptive writing and review of the data at various stages of the data collection process also facilitated the practice of reflection for the researcher.

To aid in results analysis, the researcher continuously reviewed the data collected during the study. Gathering data without analyzing as they are collected could have been counterproductive to proper analysis and reporting. Merriam (2009) stated that “without ongoing analysis, the data can be unfocused, repetitious, and overwhelming in the sheer volume of material that needs to be processed. Data that have been analyzed while being collected are both parsimonious and illuminating” (p. 171). The research analyzed the data as they were collected by repeated review and documentation of emerging themes that presented themselves.

Another strategy utilized in this study was the act of member checking (Creswell, 2007). After collecting survey results, each iTeacher received the questions and their individual responses via email and was asked to review, verify responses, and contribute additional information to provide the most accurate interpretation of their perceptions. In both surveys and interviews, iTeachers and iLeaders were also asked open-ended questions in order to allow participants to give any other details relating to their experiences in their environment. Interview transcripts were emailed to the participants,

once again eliciting their collaborative contributions to the research.

The validity of processes was confirmed through the use of triangulation of data sources and types. Stake (1995, as cited by Tellis, 1997) defined triangulation as the protocols utilized for the sake of accuracy as well as alternate explanations. Yin (1984, as cited by Tellis, 1997) suggested the use of multiple sources of evidence in case studies as a means of ensuring construct validity. The sources of data in this research included the previously referenced baseline assessment, research report from midway through year 1 of implementation, the researcher-adapted survey for iTeachers, and the researcher-adapted interview queries for the iTeachers and iLeadership. Planning the employment of multiple sources of data for research helped certify the internal validity of this study.

Formative and summative measures were taken to ensure the clarity and validity of the adapted, researcher-generated survey and interview questions. In developing the data collection instruments, a variety of surveys and interview questions were researched. Those pertaining most directly to this study's purpose and its research questions were included in drafts of a survey and two sets of interview questions. A committee of members with knowledge of iElementary was formed in order to review all questions and provide feedback to the researcher. Based on their feedback, the researcher altered instructions and questions to ensure clarity of language usage and pertinence to this study. The collaborative work of the researcher and committee members certifies the validity of the adapted questions for the survey and interviews.

Limitations and Delimitations

A limitation of this study might be that the results are not generalizable, a desirable quality of research. This would be a result of the choice to evaluate only one case, iElementary, and the unique phenomenon of their 1:1 iPad program in its infancy.

As the research suggests, many factors influence the teachers' integration of technology; a wide variety of causal variables may present themselves in this type of research.

Another limitation may be the number of qualifying participants who are also willing to participate in the study. The iTeachers meeting the criteria chosen for their participation may also impact the number of participants, as there may be a limited number of returning teachers who can speak to their experience prior to/during the implementation of the program. Prekindergarten iTeachers were excluded from the study as they were not 1:1; however, future studies of iElementary may include them in the data collection process as prekindergarten students will be participating in 1:1 in the 2015-2016 school year.

Chapter 4: Results

Introduction

As detailed in Chapter 3, data were collected and reviewed in order to gain a better understanding of the unique phenomenon at iElementary. It was essential to explore multiple facets of the 1:1 iPad initiative at the school since the research surrounding technology integration in such a setting suggests quite a number of variables that could have potentially impacted their program. In this research, two sources of archival data were examined, both conducted outside of the research designed specifically for this case study. A baseline assessment was conducted before the start of the initiative in 2011 by the district; its purpose was to ascertain iTeachers' prior attitudes toward use of and access to technology, as well as to understand their predicted outcomes of the initiative, further demonstrating their attitudes about technology and about possibly adapting to a different way of lesson planning and implementation in a 1:1 environment.

Other archival data included in this study were from research conducted by a third party from a local university. In order to maintain the anonymity of iElementary and to protect the identities of participants in this study, this researcher did not reveal the specific source of the third-party data; however, the researcher did obtain permission from the third-party researcher in order to include the data in the reporting. Both sources of archival data, the baseline assessment, and the third-party research report provided details about the case that were relevant to the four research questions and gave insight into the case at iElementary, providing background details that help paint a full picture of the perceived impact of the 1:1 initiative in pedagogical terms.

Archival Data: Baseline Assessment

In 2011, year 1 of implementation of the 1:1 initiative, a baseline assessment was

conducted by iLeadership (in collaboration with the school district) of iTeachers in Kindergarten through fifth grade in order to determine their use of technology, types of use, and thoughts on the potential impact of the upcoming 1:1 iPad initiative. Responses were received from a total of 21 grade-level teachers: all four kindergarten teachers, all four first-grade teachers, three of four second-grade teachers, all four third-grade teachers, all four fourth-grade teachers, and two of four fifth-grade teachers. There had been little change in grade-level teachers since that time. Sixty-seven percent reported frequent use of technology in their classrooms; 28% reported often use; and 5% reported never using technology. Teacher technology use at home was reported to be consistent with that of their classroom use, with the exception of the 5% who reported never using technology; they reported frequently using technology at home.

When asked to identify student engagement in their classrooms, 33% said that their students were frequently engaged, while the other 77% responded that they were often engaged. The types of technological devices used in the previous school year were also reported (Table 1): 81% used laptops, 100% used desktop computers, 67% used digital projectors, 33% used DVD players, 29% used VCRs, 57% used television sets, 43% used overhead projectors, 10% used interactive whiteboards, 19% used cell phones, 14% used iPods/iPod Touches, 5% used iPads, and 5% used Nook tablets. According to iLeadership, each classroom was equipped with one laptop, at least one desktop, and one overhead projector. Some digital projectors and interactive whiteboards were available at that time and were mostly used by teachers in Grades 3-5.

Table 1

Preimplementation Technologies Used by iTeachers

Technology	Percentage of iTeachers Who Used
Laptop Computers	81%
Desktop Computers	100%
Digital Projectors	67%
DVD Players	33%
VCRs	29%
TVs	57%
Overhead Projectors	43%
Interactive Whiteboards	10%
Cell Phones	19%
iPods/ iPod Touches	14%
iPads	5%
Nooks	5%

Teachers who reported using cell phones, iPods/iPod Touches, Nooks, and iPads were using their own personal devices, as those were not provided by the school. iLeadership indicated that the lack of devices and training on technology integration were factors that influenced the teachers' use prior to the 1:1 initiative.

In 2011, the teachers preparing for 1:1 implementation gave their predictions on the initiative's possible impact on teaching and learning. Sixty-seven percent indicated that they expected higher student engagement; 38% thought that student achievement would be improved; 24% predicted increased student motivation, and 19% cited 21st century skills/readiness as benefits of using iPads.

Archival Data: Research Report Submitted by a Third Party

Research was conducted by a third party at iElementary in January and February of 2014. Qualitative interviews and an observational study were the method utilized in order to gather teacher, administrator, and personnel perceptions and experiences in using the iPads in the classroom; to make claims about the iPad as an instructional device; to ascertain strategies that would facilitate other computing initiatives; determine any impact on student achievement; to investigate other relevant items of study (i.e., device durability, professional development, lessons learned during the roll-out).

According to the summary report, the study found four main concepts that emerged through data collection: accountability, communication, active learning, and student engagement. Teachers and students were more easily and quickly aware of performance through the use of technology. Assessments and reporting happened instantaneously because each teacher and student had just-in-time access to assessments and data. Professional communication among the teachers was improved throughout the initiative as they used the iPads in order to message and email one another before, during, and after school, allowing them to better discuss instructional planning and implementation. As observed in the study, students were actively engaged in their learning, often seen not working in unison but at their own pace. Teachers cited the iPads as instruments that excited the students, allowed students to create their own learning products, and gave them more opportunities to differentiate instruction for their students.

In their responses to open-ended questions, teachers expressed their concerns about the 1:1 program. Most commonly, they reported a need for ongoing, differentiated professional development. They also discussed the difficulty of monitoring all students while each completing a variety of tasks on the iPad. Some teachers indicated that

technical problems (e.g., wireless network connectivity) posed a challenge for them.

Others stated that as the school's population grows and new students enroll, there are not enough devices to allow each student to have an iPad, making transition into their instructional environment difficult.

The report concluded that there had been a shift in the culture at iElementary since the beginning of the 1:1 initiative. The focus began with what teachers and students could do with the iPads to how they could serve to efficiently optimize in-depth learning opportunities. While the initiative began with an isolated focus on the technology itself, the focus shifted to school improvement programs and strategies that would best benefit their students.

Data Collection and Results Analyzed by the Researcher

Three data sources were adapted/developed by the researcher of this study for analysis: the iTeacher survey, the iTeacher interview, and the iLeadership interview. As explained in Chapter 3, the inquiry of case study “copes with the technically distinctive situation in which there will be many more variables than data points” and “relies on multiple sources of evidence, with data needing to converge in a triangulating fashion” (Yin, 2006, p. 18). Exploring these data, along with that of other researchers, provided more reliability in the results of this research, connected to the research of this study's framework, gave a better understanding of the phenomenon at iElementary, and told the story of iTeachers from different viewpoints. The results of these sources are detailed in the sections that follow.

Researcher-Adapted iTeacher Survey Results

Of the 20 criterion-eligible iTeachers invited to participate in the survey, only seven responded. One iTeacher chose not to participate, as indicated on page one of the

online survey. Another iTeacher chose to participate only in the survey but not the interview and was consequently not considered in the reporting of this research. Five iTeachers both fit the criterion for this research and also were willing to participate in the two components of the research. The results of their survey responses are detailed in this section of the chapter.

The survey had various sections that included questions relevant to this research and its theoretical framework. Each section was aligned to the four research questions. There were six sections in the survey. The first section collected demographic information with nine questions total. The following section, Benchmark 3: Technology Integration with the iPad, had eight questions in which iTeachers self-assessed their level of integration and use of the iPad. The third survey section, Teaching and Learning with iPads: Classroom Use, had 14 scenarios of iPad use for which iTeachers were to indicate frequency of use for each scenario (e.g., create media presentations for your class). The fourth section, Self-Efficacy: Comfort Level with the iPads, had 12 uses of the iPad for which iTeachers rated their own comfort level. The next section, Perspectives on the iPad, had eight statements related to teaching with the iPad and iTeachers' beliefs about its use; iTeachers rated their level of agreement/disagreement with each statement. The final section, Perspectives on the iPad II, asked iTeachers to rate the impact of iPad use in the classroom based on their perceptions and experience; 12 outcomes were presented in this section for them to rate, and in case there were unknown potential outcomes perceived/observed, there was an "Other" option included at the end of the section.

Demographic information obtained from the participating iTeachers indicated that various grade levels and subject matters were represented. Two third-grade teachers participated along with one kindergarten teacher, one second-grade teacher, and one

special-subject teacher (21st century skills); similar to art and music classes at iElementary, 21st century skills are taught to each class twice a week for 45-minute classes. Two of the teachers had only taught for 2 years prior to their work at iElementary at the start of the 1:1 initiative. One teacher had taught only at iElementary, beginning 2 years before the school went 1:1. The most experienced participant had 12 years of experience, with 9 of them spent at iElementary. Each of these participants was randomly designated as iTeacher# in order to provide anonymity.

In order to answer Research Question 1 (Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive), queries in survey sections were designed to determine iTeachers' perceptions. Three survey sections asked iTeachers to identify any possible changes: Teaching and Learning with iPads: Classroom Use; Self-Efficacy: Comfort Level with iPads; and Perspectives on the iPad. In Teaching and Learning with iPads: Classroom Use, all five iTeachers answered that they used their iPads at school for research, lesson planning, managing students, teaching/presenting, accessing resources, and communicating every day, some several times a day. Their use of the iPads for creating multimedia presentations, quizzes/assessments, and handouts was less frequent than other uses, as the majority answered that they did so several times a month.

As Grunwald's research suggests that frequency of technology use and level of comfort level with the technology are linked (Grunwald & Associates, 2010), iTeachers were asked to identify their perceived comfort and ability levels in the survey section Self-Efficacy: Comfort Level with iPads. Eighty percent of iTeachers surveyed indicated that they found it very easy to deliver instruction to their classes via the iPad. Eighty percent stated that they very easily used the iPad to present to students. One hundred

percent said that it was very easy for them to explore educational apps, communicate with colleagues, and access digital resources for lesson planning and preparation. All iTeachers stated that they could very easily use the iPad for word processing and productivity.

The survey section, Perspectives on the iPad (Table 2), was designed to shed light on the pedagogical changes that iTeachers have perceived. Sixty percent agreed that their teaching practices emphasized teacher uses of the iPad to support instruction, while 40% strongly agreed. They all stated that the iPad made their teaching more student-centered and interactive. Eighty percent felt that their teaching practices emphasized student uses of productivity apps on the iPad, and the other 20% agreed strongly with this. Forty percent agreed and 60% strongly agreed that their teaching practices emphasized student use of the iPad as an integral part of specific teaching strategies, e.g., project-based learning, cooperative learning. The majority of iTeachers either agreed or strongly agreed that iPads have helped their students become more independent, work more collaboratively, and be more engaged in their learning, thus leading to their academic success.

Table 2

Perspectives on the iPad Results in Percentages

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
My teaching is more student-centered and interactive when the iPad is integrated into instruction.	40%	60%			
My teaching practices emphasize teacher uses of the iPad to support instruction.	40%	60%			
My teaching practices emphasize student uses of productivity apps on the iPad, e.g. word processing, presentation.	20%	80%			
My teaching practices emphasize student use of the iPad as an integral part of specific teaching strategies, e.g. project-based learning, cooperative learning.	60%	40%			
Using the iPad has helped my students become independent learners and self-starters.	40%	60%			
The iPad has helped my students work more collaboratively.	40%	60%			
The iPad has increased my students' engagement in their learning.	60%	40%			
The iPad has helped my students achieve greater academic success.	60%	40%			

Answering Research Question 2 (Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation) also involved analyzing the responses to survey questions from survey sections Self-Efficacy: Comfort Level with iPads and Perspectives on the iPad along with Benchmark 3. The Benchmark

3 section (Table 3) was developed and utilized at iElementary by iLeadership to rate the iTeachers in their use of technology. This benchmark is specifically for iPad integration. In the survey for this research, iTeachers rated themselves from Levels 1 to 4, where 1 is deficient and 4 is exceptional. In terms of daily use, 80% rated themselves at a level 4, whereas 20% chose Level 3. Sixty percent were self-assessed at a 4 in terms of creating meaningful lessons that allow student use of the iPads for 50% of the school day; 40% rated themselves at a Level 3. All iTeachers selected a Level 3 for their utilization of apps in order to allow students to practice various skills as they work toward mastery. The benchmark that stated, “Teacher creates lessons/activities that allow students to create various products as a means of demonstrating understanding” received the most diverse self-ratings, with 40% at Level 4, 40% at Level 3, and 20% at Level 2.

Table 3

Benchmark 3 Results in Percentages

	Level 1	Level 2	Level 3	Level 4
Teacher and his/her students use the iPad 2 daily.			20%	80%
Teacher creates meaningful lessons that allow students to utilize the iPad 2 for at least 50% of the school day.	20%	20%	20%	60%
Teacher integrates the iPad 2 with web pages, software, documents and Keynote presentations.			60%	40%
Teacher creates lessons/activities that allow students to create various products as a means of demonstrating understanding.	40%	20%	20%	40%
Teacher also utilizes apps in order to allow students to practice various skills as they work towards mastery.			100%	
Teacher plans the usage of apps via lesson planning and monitors that students are on task and utilizing appropriate apps during the instructional day.	20%		80%	
Teacher trains students on how to properly use and care for the iPad 2.			20%	80%

In an effort to answer Research Question 3 (What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child), iTeachers responded to questions in the following survey sections: Perspectives on the iPad and Perspectives on the iPad II (Table 4). Eighty percent noted student engagement and interest as well as their motivation had greatly improved, with 20% also noting improvement. Student participation in class improved according to 80% of iTeachers, while 20% stated that it had greatly improved. Students' interactions with other students improved, although 20% felt that there was no impact. Eighty percent said that students' ability to work collaboratively had improved, and 20% said that

collaboration had greatly improved. One hundred percent of participants found that student preparedness had improved as well.

Table 4

Perspectives on the iPad II Results in Percentages

	Greatly improved	Improved	No impact	Declined	Greatly Declined
Engagement/interest	80%	20%			
Students' motivation	80%	20%			
Quality of work		60%	40%		
Ability to work independently	20%	40%	40%		
Participation in class	20%	80%			
Ability to retain content material	20%	40%	40%		
Interactions with other students		80%	20%		
Behavior	20%	60%	20%		
Interactions with teacher		80%	20%		
Ability to work in groups	20%	80%			
Preparation for class		100%			
Attendance	20%	40%	40%		

Survey questions in the sections titled Teaching and Learning with iPads:

Classroom Use, Self-Efficacy: Comfort Level with iPads, and Perspectives on the iPad were used in order to help answer Research Question 4 (Based on the experience of iElementary teachers, which factors influence teacher self-efficacy). As mentioned earlier, iTeachers indicated that they used the iPads in the classroom with frequency, that they acquired a level of comfort with them, and that they perceived the iPad use with students as having positive outcomes.

iTeacher Interview Results

In order to explore iTeachers' beliefs about technology, going 1:1, frequency and types of use of the iPad, training and support, and the possible impact of the phenomenon at iElementary, the researcher of this study conducted face-to-face interviews with the

five willing iTeachers who had also participated in the online survey. There were 12 questions that were asked of each iTeacher – eight questions and four subquestions, followed by an open opportunity for any additional comments. The questions were aligned to the four research questions (see Appendix D) and were followed by an open opportunity at the end for adding any additional comments before debriefing.

Interview question 1 asked the iTeacher to indicate how s/he felt about technology in general in order to better understand the attitudes and belief of each participant.

iTeacher1, iTeacher2, and iTeacher5 all spoke positively about technology and its ability to connect the world. iTeacher2 responded, “I feel like it puts the world at your fingertips.” With respect to using technology in the classroom, iTeacher1 stated, “I want to take them places they normally wouldn’t be able to go and to do things, like be able to create a presentation in an app and import picture to show what they’ve learned.”

iTeacher4 expressed satisfaction with technology being a part of the learning environment today, making school more relevant to everyday life. iTeacher3 and iTeacher5 discussed both positive and negative sides to technology today. iTeacher 3 explained,

I believe it affects all of our lives, but I get frustrated by it more so because you get it and almost immediately, it's old, like a car off the lot, so when I get any new technology, I get excited, but then something new comes out, and I wish I had that. That is been frustrating for me.

After pointing out the global aspect of technology in society, iTeacher5 said,

Now, I do have to be honest. Sometimes I get tired of the technology, you know, because it does have its drawbacks. It is a little addicting and dependent, so therefore when it shuts down, it kind of throws off your day a little bit, but really,

technology is not bad thing.

Interview question 2 also was included in order to gauge iTeachers' beliefs and attitudes about technology but more specifically within the classroom. When asked, "What place (if any) does technology have in the classroom," all five iTeachers affirmed that technology does have a place in the classroom, citing different reasons as to why they felt this way. iTeacher1 found iPads in the classroom useful for modeling and facilitating lessons, as well as for assessing student performance and consequently developing individualized learning experiences for each student. iTeacher2 indicated that technology is used a lot in class, fitting into any subject area taught. iTeacher3 replied,

I think that it definitely has a place. I think that every classroom needs to have some technology, whether it's a SmartBoard or iPads even just the enhancement system [speakers and microphones used by some iTeachers], but I think it's just one tool of many that make them successful, and by successful, I mean student achievement and growth, so I don't think it's an end-all be-all. I think that you can still have success without it but where we are in terms of students before they even get to us, they live with technology and want it in their hands because they had that home. They definitely have to have it in the school. It's sort of like hundreds of years ago with the slate. That was the new tool. Now, we have a new tool that kids are really expecting when they come to school, and I feel like parents expect it from the schools. If you go to open house and you see just a chalkboard or a dry erase and a bunch of textbooks, that would be pretty alarming. I want my kids to go to a school and have technology so that they'll be prepared for the future.

It was the opinion of iTeacher4 that technology "has a huge place in classrooms. There

are a lot of benefits if it's incorporated correctly, and it's not just given to kids with no input.” iTeacher5 reiterated the importance of using technology for connecting society globally, opening more opportunities for students in a global sense.

The third question was asked in order to gain the teachers’ perspective on their roles in technology integration. iTeacher1 and iTeacher4 identified the teacher as the facilitator in the technology-rich classroom. They each also expressed the importance of the teacher in setting and enforcing expectations for responsibly using technology in the classroom. iTeacher2 and iTeacher4 also stated the need for the teacher to guide students in learning to utilize technology appropriately at school. iTeacher2 answered,

I think you definitely have to be very explicit on what you want kids to do and model how you need to use it. You have to think about what is the best way to use it. You can’t just let kids go willy-nilly, you know, because it’d be a disaster. So, you have to teach them your expectations, show them what you want with different projects and that sort of thing, so the teacher has to be heavily involved throughout the process.

iTeacher5 talked about the teacher as planner, integrating technology with the content.

iTeacher3 asserted that

The teacher is the most vital part of its success. You could put 50 iPads in the classroom, you can have a Smartboard in the classroom and all the technology pieces in place, but if the person using the tool is not competent in utilizing the tool, it’ll be used inappropriately.

iTeacher3 continued, “So if a teacher isn't trained appropriately or the teacher isn't willing to learn or the school isn't willing to put forth the effort into educating the teacher in how to use it appropriately, then it would fail.”

When asked “How do you use the iPad in your classroom,” iTeachers gave details of iPad use with their students at iElementary. iTeacher1 said,

We still have to use some paper and pencil at this level. In the lower grades, we have to teach penmanship, show them how to hold a pencil, and the basics things that should've been taught to them before kindergarten. We use some apps to work on using their fingers to form letters as well as identifying letters and their sounds, but holding a pencil is something important that we have to show them how to do. The students take notes on their iPads, make presentations, take pictures and videos, and use apps to help them learn to read, write, and think.

iTeacher2 stated,

We use it a lot for creating. In the beginning, we used it for apps to get on to practice different skills, but now we use it more for creating things to explain our thinking in math and take pictures of our work. We give them the notes in reading and math on their iPads so that they can follow along and take notes so they have everything right in front of them and can mark and delve deeper into what we're reading.

iTeacher3 asserted,

Well, we use them every day in every way, from morning to the afternoon. It was used in the beginning as more of a way to get the information that I was presenting to the kids to help them focus a little bit more, but I know that our team, we really moved away from that, and we use it much more as productivity tool, and I don't mean like glorified worksheets! Our kids really did make their own graphic organizers, their own slide-shows to organize their thinking. It's a great way for us to see what they are learning and how they are learning it, and

especially with the productivity piece, I can see easily where their misconceptions are. We use it for research, so Science and Social Studies time are really good to give them problem-based learning projects, and they just run with it, which is nice. It's nice to have to tool there. We learned how to use QR codes, and in grad school, I learned how to build webquests, so that helped guide their research since the kids can go anywhere on the iPad. We use it for homework by putting a video of ourselves in there, so it's similar to if they went home and watched Khan Academy videos for math, but it's more personalized because it's us. We drop the video in, explaining what they have to do, so there aren't a bunch of questions because the instructions were there for them and their parents to know what to do. That helps us save time as a team to divide the video creation up and create different videos for different days. I have the kids video me at the summary of my lessons so they can watch and re-watch them at home. That's helpful to the students and also the parents who may not know what we're working on in third grade.

iTeacher4 answered,

I use it daily, without a day that goes where we don't use it for something. I use it for everything from the guided part of my lesson. It's more like a follow-along, where the kids could work out problems with me. They have the template, the graphic organizers, and resources all there in front of them. Also, an important part is the creation piece, so I've taught a lesson, and now, I want you the student to take it to the next level given guidelines, some parameters, or a template that's set up for them to download it, and then, you're showing me what you wanted to create about what you've learned.

iTeacher5 responded,

I use my iPad with my students several different ways. We use different apps and different online programs that help work on different standards as well for research projects, for creating, for communication, and for critical thinking in all content areas. With the technology, the kids are able to work on those 21st century skills using the iPad. I'm able to send information to them instantaneously as well as receive information back from them, so that's how it's used with my students.

To determine frequency of use, iTeachers were asked to identify approximately what percentage of their instructional time with students involved the students' use of the iPad. iTeacher1 discussed the need for acclimating students to school in general before introducing the technology into their school day, increasing iPad use as the year progresses:

We use the iPad about 50-60% of the day. We do take some time for them to adjust to school in general at the beginning of the year, and then, they start off with the iPad just for small portions of the day, and each day, we use them a little bit more and more. It's got to be a good mix for lower-grade students so that fundamental skills are still taught. We want to be able to set them up for success using the technology, which has been a huge asset to the classroom.

iTeacher2 said that students use their iPads "about 75% of the day. We use it every day.

We use it in reading and math every day. In science, we go back and forth because sometimes, we're doing hands-on experiments that don't really need as much technology." iTeacher3 replied, "I'm going to take away from their Guided Reading time with me because we use actual paper books, so I'd say probably about 75-80% of time

during a school day, we use the iPads in class.” iTeacher4 approximated that iPads were in use in class “about 70% of the time.” iTeacher5 explained,

In the 45-minute block that I have students each day, they use the iPad probably 40% of that time. Once I do an introduction, they break off into their groups and complete the assignments, whether it’s researching, creating, or documenting their learning through the use of the iPad.

In the next interview question, the researcher asked iTeachers how they feel about each student having an iPad in their classroom in order to better understand their perceptions on being 1:1 at iElementary. iTeacher1 and iTeacher2 praised the iPad program but also mentioned that some students generally have difficulty focusing, regardless of the type of manipulative that might or might not be there for their use. iTeacher2 said,

I think it's great for every student to have an iPad; however, there are some students that I think need to be monitored a little bit more than other students.

There are some students that need to sit close to me and sometimes, I need to take it up because it's a distraction, but for most students, I think it's great for them to have 1:1 access all day every day.

iTeacher3 replied,

Every student should have an iPad and have access to it. I would first say that it is the sheer number of them, of having a 1:1 program that I like because if I would only have five iPads, I think it would've created such a challenge for me in deciding who gets the iPad and when. I think if you could have the iPads, the ratio needs to be one-to-one. In my class, having 1:1 makes things easier because my expectations are much clearer, showing students what's expected for this

project or this part of the day or this lesson, and this is what's expected of you; this is how you can use the iPad. It's made organizing and planning so much easier, and then I just think it's best to have equitably in the classroom, putting an iPad in the hands of each student.

iTeacher4 responded,

I love it! I love that every kid here has an iPad. I think it makes the learning much more engaging and more meaningful. They all have the ability on the spot to do some kind of creation or some type of electronic poster of what they learned that they wouldn't be able to do if they didn't have the technology right in front of them because you've got to reserve the computer lab and you can only go maybe once a week for 45 minutes. Students really can't learn these 21st century skills, learn how to do word-processing, and learn how to make presentations.

Everything that we do here, while I'm not explicitly teaching how to make a presentation, how you write a document, or how to make a bar graph, through choice and exploration, it's incorporated into the learning. Our students are gaining skills that they'll need for high school, for college, and for their future jobs. We're really preparing them by using the technology daily.

iTeacher5 identified the positive and negative sides of having a 1:1 iPad program:

It's a good opportunity for kids to be given an iPad because we do work at a Title I school, so a lot of the students would not have the opportunity to have certain technologies actually in their lives outside of school. So, having the opportunity is a good thing, but it also has its limits. We are an elementary school, so when they do leave us to go on to middle school, they're not leaving with the iPad. They won't have the information and the skills being in a classroom that doesn't

have the technology piece, so that will take some adapting. I think it's hard sometimes when our technology may fail in the classroom, and I have to go back and go old-school unfortunately, sometimes without the technology, and that's hard for the students, too. You're not always going to have technology everywhere.

Question 6a asked iTeachers to identify any benefits that they might have observed from their students each having an iPad. All five iTeachers noted an increase in student engagement now that the iPads are part of teaching and learning at iElementary. iTeacher1 compared iElementary 7 years ago to the present:

We had a lot of kids struggling. The way we deliver the lessons or the lessons themselves in general have changed. I think it's really adding that piece of technology in that's provided a lot of engagement and retention. The iPads have given them something to hang onto and to remember. They can now show me their learning and use the iPad to explain things that they might not have remembered if they hadn't created something on the iPad about it to explain to me. I definitely see a difference in their performance from before.

iTeacher2 claimed that the students think a bit more with the iPads and that they can show their thinking more easily with its use: "I can see it in their projects, even though I can't get to every individual student, I can actually see their thought process, and they can explain their thinking on the iPad." iTeacher2 had also observed students collaborating more. iTeacher3 replied,

There's definitely been an increase in engagement. There has also been an increasing sense of responsibility, and I know that you're going to ask me about the challenges. Our biggest challenge is that you have to teach them how to be

how to be citizens, how to be responsible digital citizens so it took conversations to a new level. We have to teach them how there are consequences online and how to use the technology appropriately. It definitely was a struggle because we had a lot of things that we didn't expect until we started from the program. When they get engaged, which is exciting and they love doing everything on the iPad, but then there was this line that they would try to cross, so I actually saw a benefit of this challenge because I'm able to teach them another whole idea of rewards and consequences in a completely different way than we'd ever done in school before. When you are a citizen, this is expected. There are people who watch your computer, who know your IP address, and you do have a responsibility as an adult using technology so it's just on a different level for kids. Instructional engagement but also digital citizenship are both aspects that we had to start teaching them here at school that we hadn't before. That's a huge benefit even though it's a challenge.

iTeacher4 said,

I think one of the biggest benefits is engagement. They have that tangible object in their hands and are constantly able to create and manipulate using the iPad versus being bored with worksheets, tapping their pencil on the desk. They're actually focused more so with the iPad and the MacBook than if we didn't have them and use them.

iTeacher5 answered,

I have noticed that some kids are more prone to paying attention, being more focused in the lesson, being excited about using the iPads to learn. It's hard trying to find that balance of not draining them with the iPad, with the same apps all the

time. You have to mix it up a bit, but they really do enjoy learning with it.

iTeachers were asked by the researcher to also identify any benefits that they might have experienced through their use of the iPad. iTeacher1 stated,

I think just in getting out of my comfort zone. It'd be probably easier for me to go back to my old-school way of teaching, but when I see the kids' excitement and engagement, I know that I just need to keep working toward becoming better and better with my technology use with students.

iTeacher2 claimed,

I honestly use my MacBook more than my iPad because for me, it's just easier to plan and create, but everything syncs and sends to their iPads, so what I create transfers to their iPads. Then, I preview things to see what they'll be like for the students on the iPad.

iTeacher3 said,

I get to see them thinking, their creativity, and tapping into their different learning styles. You have kids who want to create a graphic representation, and some of the kids wanted to rap a song and put it into their recording devices, so I like that. It's also much easier to organize and keep track of work, so instead of having a bunch of pieces of paper that I had to file and that students had to go back through, we're creating digital files and can store them all in one place. A huge benefit of it, too, is when I have parents come in, to show their work, we get out their iPad and see what they've been doing. Also, a huge benefit is the ability to communicate with home and school, using the iPad, using instructional videos, because parents had never been able to do that before. They had to have called if they had a question. I know that using Class Dojo, which is a classroom

management tool, we can easily let parents know about students' behavior and go back and forth via email instantly. These things used to interrupt the day, having to stop and call, whereas now we can easily send the information out to parents. It's help build a sense of a relationship between the parents and teacher and the student. That was a benefit that I definitely didn't foresee happening when we started this program.

iTeacher4 responded,

I like the quickness of it in a sense. I can give you an assessment, you can turn it in to me through, and it's all electronic. That way, I can see your progress and give you immediate feedback. It's so easy to share your work with our parents or email different things, so the convenience factor is important. One of the things that we're trying to push this year is using videos to flip the classroom, so I may have taught you something, but now you have your iPad at home, so if you have the Internet, you can watch this video that I've attached your homework and can watch the video at home. Parents can watch the video with you and give us a way to incorporate school and home and bring it all together.

iTeacher5 answered,

The biggest benefit is just the convenience – being able to have that technology piece, being able to find information quickly and easily, and being able to manage and adapt to situations more easily in the classroom. Let's say I'm teaching one lesson, and then, I find out that from the teacher that they are on a different standard this week, having that piece of technology makes it easier to adjust my lesson quickly. I have to change the way of thinking and researching, looking at the books and other materials to fit what you're learning, so the iPad gives me

more freedom.

Subquestion 6c was asked in order to identify the challenges that iTeachers may have experienced with the 1:1 iPad program at iElementary. iTeacher1 identified a challenge for kindergarten students with facilitating the step-by-step learning process that is necessary for younger students: “They’re learning the technology as their learning all of their other skills, but a lot of our kids want and need step-by-step directions, which takes a lot of time, especially at first.” iTeacher2 claimed that the biggest challenge had been “just trying to stay ahead of the curve,” continuing by saying that

you can only use an app for so many projects. You have to try to figure out new and creative things that they can do, so it's kind of time-consuming to explore some of those things and different ways that they can do their work. That's pretty difficult.

iTeacher3 asserted,

Getting the kids to an understanding of what the expectations are and what's right or wrong has been a huge challenge. Things are great with the iPad, but there has to be a consequence. So, when an iPad is taken from a student because of behavior as a negative consequence, it's then up to us as teachers to figure out how kids will learn when we're so used to having the iPads, and there's then a whole behavioral systematic that has to be in place, which was unexpected.

Another big challenge is when technology fails. You just always have to have a backup plan to know what you're going to do it. If they have to share with somebody because theirs isn't working, then the responsibility is on the student with a functioning iPad to do the work. Rewards and consequences are both challenges for students since they all want to have their own iPad.

iTeacher4 stated,

I think that management is a big challenge, especially if you don't set your expectations early on, because students might go on websites that might not be blocked and are inappropriate. There's an app that we've been using, and we learned that students are able to set up chat rooms, so we keep learning things as we move on and try to educate the students on responsible use. There's a lot of freedom that they have with the technology, so it's really important to set those expectations for students with consequences whenever necessary. We have to continue to work on the loopholes that might pop up so that we can keep students safe online and teach them how to properly use their time for learning.

iTeacher5 replied,

The challenges are when the technology isn't accurately working all the time because if your system is down and your whole lesson is technology-based, you have to change the way you're gonna teach it and still get that concept across. Another challenge is that some kids enjoy the iPad but not always as a learning tool. They may want to be on a site because it's fun and not because it's educational. I could see it as a distraction because they have a little bit more freedom that other people do. Sometimes, technology use does backfire, but you have to find that balance and have a good management system in place.

As training and support are paramount to teachers' technology integration (Mumtaz, 2000), the researcher asked iTeachers to talk about the training and support that they have had throughout the 1:1 initiative at iElementary. iTeacher2 and iTeacher4 claimed that the district started professional development at iElementary at the start of the initiative (during the summer of 2011). iTeacher4 said, "We started with the basic

functionality of the iPad so that we'd be comfortable with it." iTeacher4 then added,

Since [the initial trainings], the trainings have become more differentiated as the need and use have grown. We offer different sessions that you can go to.

Administration does a really great job of picking staff based on their strengths to give trainings to everyone. For new staff, we have those basic sessions so that they can catch up if they have no background on the technology here. We want everyone to be on the same page, but over time, we learned to offer more options for different needs.

iTeacher2 explained, "[Our district] provided several trainings in the beginning, but now, we have our own in-house trainings. I think we only know what we need for using the iPads on an everyday basis." Trainers from Apple had also provided professional development for iTeachers, according to iTeacher3 and iTeacher5. All five iTeachers mentioned continuous training and support by the school's technology facilitator. Every other Monday, every iTeacher at iElementary attended mandatory "Empowerment Sessions." iTeacher1 explained,

You go during your planning time, and [iElementary's technology facilitator] shows us something that we already have but just as a refresher or introduce new apps or sites. Typically, if we were left on our own, we would just be doing same thing every day, so this time allows for some creativity and keeps things from getting too stagnant in the classroom.

iTeacher3 offered, "This [bi-monthly professional development] just enhances the work of the forever-learner. We can't just think that we've got everything we need. There's always something new to learn." iTeacher5 explained that there had been plenty of professional development on site, and regularly, iTeachers learn on their own:

“Sometimes, you just learn by taking it home and exploring it yourself. You just have to play with it to really get comfortable with what you are doing.”

Question 8 queried the five iTeachers on the changes, adaptations, and/or philosophical adjustments they have made as a result of having the iPads for teaching and learning in their classrooms. iTeacher1 responded,

I think that, again, it's outside of my comfort zone. There's more planning ahead that you have to do, but the students can move at their own pace. If I was teaching the old way, students might just read a book or wait for the whole class to finish, I have increased on-task time by planning ahead and setting expectations for students. Once they finish one activity, they can move right on to the next, so I have to be ready for that by planning ahead and knowing what it is that I want students to do next in order to scaffold their learning. For some students, the concepts didn't click before, but with technology, they're able to get things much more quickly, so I have to be ready to move them and push their growth.

iTeacher2 replied,

I think I've had to let go a little bit more just because different students might show their thinking and learning in different ways from how I had envisioned, but letting them have creative power instead of saying that it has to look or be like this or do this, as long as it has the elements of what I asked for in the requirements. I have to allow them to take ownership of that a bit more. It's kind of changed.

iTeacher3 explained,

The biggest change is just in terms of lesson planning. I'm thinking about, ok, this is the lesson idea, so how can I make it better because I have the technology,

or here is the piece of technology I've been given so how can I best use it to meet this standard. That's changed for me. It's become a symbiotic relationship. I don't think that I think of the technology and then the lesson plan or the lesson plan and then the technology. It just depends on sort of what's coming out and what we're talking about. I wouldn't say that I have had any big philosophical adjustments because the instructional technology was a huge part of my undergraduate and graduate programs, so I expected to have technology when I entered the classroom. I was very lucky to have technology provided for me at my first school and then here. I've just never been without it, so I don't feel like I've made any real philosophical adjustments. In terms of planning and managing a classroom, there were big changes having the 1:1 iPads because your expectations change along with your delivery. Since technology in general was part of my education, I felt ready to use it and adapt as needed.

iTeacher4 stated,

It's tough because I only taught for one year at another school and then came here. So, I feel like if I was to now go to a school like my first one that doesn't have technology, I don't think I'd know what to do because this is really all I know. My first year of teaching, I had an overhead projector in my classroom, and that was it. I can't even imagine that now. It's become the only way of teaching for me. If I were to leave here, it'd be a game-changer because I'd have to struggle for those ways to engage my students and keep things interesting because I wouldn't have the apps that we use for projects and such. I'd have to switch from digital work to paper again and create hands-on activities to involve them.

iTeacher5 said,

I think I could definitely do more with the technology. I feel like I've barely touched the surface with it. I'm just trying to make it a point to use it, to make the students and myself aware that it is a resource, that it is a tool. Even though we have the iPad, it is not a make it or break it. If they're not here, we have to know that this is just one resource. While you have it, you need to use it because it can bring different resources that are not available to everyone, and so I want to take advantage of it. I'm not used to students teaching me or showing me how to use technology, but with all of the apps out there, they figure them out and teach me how to do things on the iPad sometimes.

Subquestion 8a also dealt with the possible impact of the 1:1 program, asking iTeachers to discuss how the use of the iPads has changed their lesson planning and/or implementation. iTeacher1 claimed,

At first, it was hard for me, and I was tempted to go back to my old ways without the iPads. Now that I've adapted, I definitely feel confident in what I'm doing. I'm able to plan more quickly now and do more with the kids every day. We can move through lessons so quickly now because I can teach, give them practice, and assess instantly, instead of waiting for me to hand back papers and look over their work to choose the next steps. The students are now creating more with the help of technology, and that has been something that I've loved seeing. Seeing the students' growth, I can see that it's working.

iTeacher2 explained,

It has changed a bit because now we have to send the students our lessons to their iPads, and before, we would type up our lesson plans in a Word document that the

kids never see, but now they can get it on there, access the resources for the lesson and follow along. I think it's actually made lesson planning a little bit easier because I don't have to sit here and type up one thing and then come together to get all the texts for the lessons. I can give it all to them every day cohesively. With minute-by-minute details on their iPads, it's made things a lot easier to have them gain easy access to a website or an activity in going to sketchbook, so it's helped with some things like that, too. They've become more engaged this way. It lets me be able to float around more and let them work in their groups to accomplish tasks. I can walk around and see what they're doing while they work at their own pace.

iTeacher3 said,

I know that the change has been thinking about how can the iPad be used most effectively in the lesson. We try often times to force it in instead of thinking, oh, that's the best way to do it. We have to take the time to find the best use of it and not force anything, and that will be beneficial to you and especially beneficial to the students, so just thinking it through, not just feeling the need to use the iPad and putting a worksheet on it just so the kids can use them. To me, that's the trap some teachers fall into, not thinking outside the box or taking a little more time of their lesson planning to instinctively think about technology integration. I think that it's something that you know as a teacher, as a school, we really could really be improving in, lesson planning with technology integration. Sometimes, the teachers think that the technology integration portion of the lesson plan template is just using the lesson plan with the students, but that's just a glorified textbook. The students aren't using the technology to learn but just to follow along. We

need to challenge ourselves in how to keep students using the iPads effectively and often. We have to move forward with the technology, making it truly about productivity and personalizing learning effectively without being very time consuming. That can be overwhelming for a lot of us.

iTeacher4 answered,

I think it's made it easier. When I think back to my previous school, if I had printed out copies of something but the kids weren't ready or need something different, there was no adjusting your plan and changing things up, but here, when I teach something and it doesn't quite work, the students just aren't getting it, it's so much easier to tweak it and change a few things around and keep going with it until they do get it. You can adjust the lesson to what the kids really need. In this past, this was my plan, and I didn't have the resources to change it to match what the kids needed. Even with small groups, if I've got a student who doesn't understand, I'm able to tell right away because I can see their work. I've got their results so quickly that I can go back and adjust what a student needs to get it. Without the technology, you've got to stop, take the time to grade 25 papers, then look at how the students did and make those decisions on what the kids need. That takes time that we don't have. Lesson planning is so much easier because of being able to share and collaborate across the grade level with other teachers. We can break up by subject area and each teacher on the team write lessons for that subject to share with the grade-level team. You can take your team's lessons and tweak them for your students so you're not starting from zero. It really makes collaboration easier for us. It also just gives us more ways to get to the kids. I may teach it one way, and it doesn't work with a student, so I use your way, and

then, I can use the Khan Academy videos, so we have three ways to try to reach students because they have access to the technology as do we. It gives us teachers more in our arsenal, so that definitely helps.

iTeacher5 affirmed,

The iPad has made it easier now. I can retrieve more lesson plans and resources online. I can research with it more easily and go paperless. It is definitely been a great way to stay organized, so it's been very beneficial with my planning and implementing my plans within the classroom.

After asking the prepared questions for the interview, the researcher prompted each iTeacher to provide any additional comments s/he may like. iTeacher2, iTeacher3, nor iTeacher4 gave further commentary. iTeacher1 explained,

I'm thankful to have the support. I need someone to help me, even be on call, just in case I don't feel comfortable. Our administration team and other faculty are teaching me new things all the time and also helping me with things that I forget how to do. It's great having that support and that help right across the hall if I need it. The administration is behind us, the district is behind us, so I'm glad that we have the support that we do.

iTeacher5 also volunteered more information at that time:

When we started this 1:1 program, I didn't think that our students would be able to keep them. I didn't think they'd use them as an academic tool. I thought that they'd think they were toys because they hadn't had much technology at all before. I was shocked at how the students gradually enjoyed learning like they hadn't before. They want to use the iPads for research and to create. They want to build and do things with the iPads. I thought we as teachers would have to be

constantly looking over their shoulders to see what they're doing, but come to find out, we have very responsible students. We just had to give them the resources and trust that they'd use them in the right way, and they have. It's been really nice to see that.

The transcript of each interview was sent to and reviewed by each iTeacher, who offered no changes to his/her previous responses as reported in this section of the results.

iLeadership Interview Results

iElementary had an Instructional Leadership Team of four members offering support in the areas of literacy, math, science, and technology. Along with the principal and one assistant principal, this six-person team was part of what this research refers to as iLeadership. The researcher invited iLeadership to participate in a face-to-face interview in order to capture their perceptions of the 1:1 iPad initiative and its potential impact. Of the six members, three were willing participants in this study.

The interview questions that were selected aligned with the research questions of this study (see Appendix E) and served as a means of validating the experiences detailed by the iTeachers. There were five interview questions, four subquestions, and an open opportunity at the end for adding any additional comments before debriefing (see Appendix F). Interview questions 1, 1a, 1b, 1c, 2, 3, and 4 related to Research Question 4 (Based on the experience of iElementary teachers, which factors influence teacher self-efficacy). Research Question 3 (What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child) was aligned with iLeadership interview questions 1, 1a, 1b, 1c, and 5. Interview questions 2, 5, and 5a related to Research Question 1 (Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive) and Research Question 2 (Based on

teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation). The results of these interviews conducted were outlined as follows. Full results were documented in Appendix G (iTeachers' interviews transcribed) and Appendix H (iLeadership's interviews transcribed).

Question 1 asked iLeadership to talk about how they feel in general about the 1:1 iPad program. iLeadership1 and iLeadership2 both expressed what a positive experience it has been. iLeadership1 replied, "I think that some type of device, whether it be an iPad or some other tablet, should've been in our school years ago so that their education is relevant to modern society." iLeadership2 explained the connection between the outside world and how iElementary students were learning: "Students these days come to use having already been exposed to technology, so it's great that they have opportunities every day to learn in an environment that matches that of their worlds outside of school." iLeadership3 responded that a technology-driven school should be 1:1 in order to be effective, but the way in which the 1:1 devices are utilized must be appropriate as well:

If it's done properly, having an iPad in each student's hand is crucial, but it has to be done properly or else, it's a waste of time. The tool is only as good as the person using it. It's got to be used effectively; if you do, it's amazing, and if you don't, it's ordinary.

In interview subquestion 1a, the researcher asked iLeadership to identify any benefits that they may have observed from teachers and students using the iPads.

iLeadership1 explained that instant feedback had been a big benefit:

Using some of the apps allows teachers to instantly gather student assignments electronically and provide feedback, whereas teachers used to collect their papers, take them home, grade them, and give them back the next day. Some students

have also been able to have conversations online with their teachers about homework after school hours, so when students are struggling with homework, they can get immediate help from their teachers. In the past, teachers have had to wait until the next day to give feedback or to help with homework.

iLeadership2 answered that, by observation, motivation had increased and was the biggest benefit for teachers and students:

Prior to the 1:1 implementation, there were kids who were reluctant learners and didn't want to come to school, and that's definitely changed. Kids can now show us their learning by creating products in whatever way they want. In areas such as math and science, we've been able to use the iPads to bring the outside world in and make learning real, and that has had a big impact on our students. Teachers now have many more resources for use with students, such as all the apps that they're using. It's made teaching and learning easier and more efficient.

iLeadership2 continued by indicating that there had been a shift to a more student-centered environment in iElementary classrooms as iTeachers were able to give students more flexibility and ownership in their learning. iLeadership3 indicated that student engagement had increased in classrooms, attributing the ease with which students could show their learning to the 1:1 iPad ratio:

We just want to know what the students know. The iPad lets them present in different ways, such as a podcast, a slideshow, a song, a comic. There are so many different ways that they can show us what they know.

In order to better understand iLeadership's views on technology (e.g., the iPad), the researcher questioned them on the benefits that they might have experienced with the iPad. iLeadership1 claimed that the iPad had helped in terms of productivity,

multitasking, and research. iLeadership1 also expressed regret that the iPad was not available for use during his/her career as a classroom teacher. iLeadership2 felt that communication had improved and that relationships were built as a result of having the iPad:

It's great as a member of leadership to walk into a classroom and have students show me something new on the iPad that I didn't know. We are learning from them, and the connections, the communication has really strengthened because we can talk about teaching and learning with this great tool. I love that I get to explore different apps and resources and then share those with students as well, so we're teaching and learning together. That new dynamic is something that I truly appreciate.

iLeadership3 responded that teaching and learning had changed, which was a personal benefit to him/her as a member of iLeadership:

Really, it's forced the teachers to think more about their instruction and to be more deliberate in their planning and instruction. It's been a great benefit to me to see the teachers rethinking how their students are going to learn. As I said before, the students are now so engaged in using the technology. We live in a digital world, and many of the students use technology outside of school all the time, and so it's great having the students transfer those skills. They do have a real skill set that they've developed in school. It allows the students to feel successful, and it allows them to use the skills that they already had. With regards to the resources that are now available to us, it's just opened so many avenues to getting the resources that we need to develop students' skills.

Subquestion 1c asked iLeadership about the potential challenges that they or

others had experienced with the iPad. iLeadership1 and iLeadership2 both discussed management of the classroom environment and instructional appropriateness of technology. iLeadership1 described the difficulty that some had in managing the use of the iPads and of student behavior in a 1:1 scenario:

Some teachers may at times want to fall back into a digital-worksheet mindset when they think that, because it's on the iPad, it must be good, instead of planning the use of the iPad for creating, generating, and synthesizing knowledge. It's also tough to manage what the students are doing when they're not looking, which is no different from any other tool that you might be using in the classroom. When you give students math manipulatives at first with no instructions, what are they going to do? They're going to play with them instead of using them as intended. That continuous monitoring is a challenge for teachers. It was perceived by some initially that they could give them the iPads and that the students would make good choices and be responsible with them. Students will sometimes make bad choices regardless, and with the iPad, sometimes teachers forget that.

iLeadership2 discussed the challenge of finding balance in a blended learning environment in which technology use was encouraged but not mandated:

There have to be opportunities for students to hold a pencil and write on a piece of paper. End-of-grade tests are still conducted via paper-pencil, so we have to prepare them for those experiences. We have to help teachers know that it's important to find that balance and that it's okay to have that balance, to not always be expected to use technology in their classrooms, especially if it's not appropriate for the task. No one here will ever come down on a teacher for using paper and pencil for rigorous tasks. The devices don't have to be used 24/7, and

we want teachers to know and expect that. There's a time and a place for everything.

iLeadership2 also reported that for leadership, finding and making time to work with iTeachers in need of extra support was a challenge. Many of the teachers have remained at iElementary since the beginning of the program, but as new teachers joined their team, their level of support needed to be elevated in order to build their confidence with the technology and its integration. Beginning and new teacher support were needed in instances in which teachers were hired or transferred to iElementary; without any background knowledge or schools, iLeadership struggled to have time to fill in the gaps:

[A local university] now requires its students to use iPads, so many of our new teachers coming from there already know the basics and can use them for productivity. We're fortunate to have that, to have student teachers and beginning teachers coming to us who already have that foundation. For other teachers coming to us from other locations, it's a challenge for us to find and make adequate time to work with them, to meet their needs, and to build their understanding from the beginning, which I think is essential to their success.

iLeadership3 answered that iElementary experienced challenges in that there were no other schools in their unique situation:

As the first 1:1 iPad elementary school in the state, we've had trouble looking for someone to compare ourselves to in our work. Are we moving at adequate speed? Are we making the progress that we should be making? We've had no one to compare to, so that meant at times that the support from the district wasn't there or was very limited. We had to trail-blaze on our own, which even though it's a challenge, it's a very positive thing as well. The other challenge is to ensure that

we don't become an app school. We don't want apps to drive the instruction; we want the learning to drive how we use the technology.

Interview question 2 asked how teachers use the iPad in their classrooms based on iLeadership's observations. iTeacher1 and iTeacher2 had observed a variety of uses in classrooms. iTeacher1 explained the growth that had occurred and needed instructional change in some cases:

Unfortunately, the same teachers who used to use worksheets are now using them for basically digital worksheets. That is the easiest option, and it takes the least management, planning, and work for teachers. Good planning and teaching continued to be good after the iPads were given out. There are teachers who've gone from good to great by creating videos and having students gather what they've learned and present it as a comic or a video or a published writing of some sort, and that's what we keep pushing and encouraging teachers to do, to work toward the creation side of things.

iTeacher2 expressed a similar concern and the process of evolving into technology integration that's both seamless and appropriate:

Initially, when teachers come in, they simply try to replace what they already want or plan to do with the same thing but on the iPad, so there's not really much change. That's part of the process. It's just a phase, as we've now learned. So, we are understanding of that. Then, there comes this transition that we notice where they realize that they can do so much more with the iPads and allow kids to take more ownership in the learning, because they can. They have the resources to do so. That's part of our vision here, having students show their learning.

iLeadership3 described the shift that, over time, had led to the organic integration of

technology in the case of many iTeachers. Having had the technology embedded in their everyday work in teaching and learning had become natural and like second-nature to them all. iLeadership continued, expressing concern about the rate at which students were being challenged continuously,

I'm going to be brutally honest, if we're not using the technology to its limits, then we're not pushing our students to theirs. Our students are capable of so much, so I want to push the limit. I want to get them into coding, to start developing their own apps. We should be pushing them every day. There's a danger in falling into a trap of students downloading texts, manipulating them, and sending them back to the teacher. That's basically a digital worksheet. As an administrator, I try to work with them and show them, model for them, that there's so much you can do for and with your students. I want us to keep moving forward and avoid those pitfalls, avoid falling into that trap.

The research asked iLeadership to estimate how often the iPads are in use during the school day with students based on their observations. iLeadership1 said that the range laid somewhere between 50% and 80%, a wide range that was attributed to iTeachers' comfort levels with and management of the iPads. iLeadership2 estimated that students use the iPad around 70-80% during the school day, as they take the iPads with them for use in their specials classes (i.e., art, music, physical education). iLeadership3 had observed that the iPads were in use all the time with the following explanation:

It's a blended environment, so even if they're writing notes in a notebook, they still have and use the technology to accompany their work, to use whenever they need it, and they do, because they carry the iPads to every class. I can't imagine

our students going to a traditional school now. It would drive them crazy because they're so used to constantly having that tool around. The first few years, when our fifth graders left and went to middle school, they were lost. They didn't have any sort of device to use. They were very disengaged at school. Now, the middle schools have tablets, and even though they're not the same kind, our students can transfer their skill set and continue to find success in the way that they know best – using technology.

iLeadership was provoked in question 4 to describe training and support opportunities that were available for iTeachers. iLeadership3 claimed that initial training and support came from the district:

We got some fundamental trainings from the district when we first started. When we learned things like how to double-tap on the home button to see all of the apps that were open, that was incredible. I still remember that and tell that story, because that's where we were! We were amazed then by just the basics, and now, look at where we are!

All three iLeadership participants identified Apple as a contributor to their professional development opportunities. iTeacher1 explained that iElementary was beyond the level of training sessions listed in the Apple catalogue and that Apple had begun customizing their training and support for their specific wants, needs, and targeted areas of potential growth. iLeadership sought to build buy-in and collaboration by providing their own in-house trainings. iLeadership3 explained,

So, we then got some support from Apple, but we soon realized that, if we wanted to really move forward, we needed to look from within. We used the train-the-trainer model with our own staff tech team, working with Apple for two days, and

then, those trainers would come back and work on what they'd learned. We'd use half-day teacher work days for professional development, and we'd split [the trainers] up based on one aspect of what they'd learned, and they'd train the teachers. Within the school, we found that we had both the expertise and the desire, and the teachers learned more because it was coming from a colleague in their building, so we got more buy-in to our PD. The teachers who were presenting had to become experts in what they were training on, so it was really a win-win situation for everyone. We still have Apple PD yearly because we want to keep moving forward with regards to the iPad.

iLeadership2 asserted that differentiated, leveled professional development opportunities that were structured around the needs of the faculty had become their focus. A group of iLeadership and iTeachers from various grade levels and disciplines volunteered to serve on a tech team. They were tasked with employing the train-the-trainer model, according to iLeadership3, during half-day professional development sessions throughout the school year as well as sessions by Apple in the summer. Tech team members designed and trained their colleagues on the technology itself and its integration in grade-level and subject-area instruction. Their vision was to empower their own teachers to become active participants in their own learning and growth. All three iLeadership participants referred to their school's bi-monthly empowerment sessions with the technology facilitator. iLeadership2 reported that the iTeachers were happy to learn with and from one another:

Some things we didn't even have to train the entire staff on because in our leadership meetings, we'd explore something with a few teachers, and then, we'd ask them to go experiment with whatever it is. Our teachers are intuitive and

perceptive, so when they saw these few teachers doing something new, they wanted to know what it was and how to do it themselves. So, some of that happened without formal instruction or introduction, which is exactly what should happen. Once the buzz was out, we could refine it and come up with other ways to use that concept instructionally.

In interview question 5, iLeadership was asked, “Since the beginning of this initiative, what changes/adaptations/philosophical adjustments have teachers made with the iPads as part of teaching and learning in their classrooms, based on your observations?” Each iLeadership participant discussed the changes that they’d observed during the 1:1 initiative. iLeadership1 replied,

It seems like a revolving door of change because at the beginning of the initiative, teachers came in with blind optimism, thinking that the iPad was going to be an amazing resource, whether they said it or not, they walked in with that mindset, that it was going to make their lives so easy. Then, reality set in, and they realized that there’s so much work involved in doing this and doing it well, no longer believing that they should do this because it was so hard. Then, it shifted back to an understanding that if they plan correctly, if I really set up the framework at the beginning, it is much easier in the long run. It’s been a shift from the quick-fix mentality into a process mindset. When teachers move into that process mentality, thinking through their lessons, their excitement come back about using it again, and you can see that grow as they’re refreshed and invigorated by this. They see that it’s not ridiculous amounts of work and that the results are worth the growth pains. It actually can make life easier; it’s just a different version of easy than they were expecting.

iLeadership2 responded,

I think that the mindset of our staff has really changed. It seems really different from that of teachers at traditional schools. We are truly building a collaborative culture here, and the iPads have helped with that. Teachers are coming together on their own and having these in-depth conversations about instruction. It's also helped with creating a sense of pride for our teachers, and for our students as well. Teachers are excited to come here and to be here every day. Are we perfect? No. Is there room for growth? Always. But since this initiative, I feel like we're well on our way. Teachers are constantly evaluating their work, and we're always looking, as leadership, at ways to tweak things, ways to make things easier for them, ways to make things better for our kids; these are now school-wide conversations, not just in terms of leadership. It's been a huge shift in our school culture. Our parents are more involved. They're now excited about our school and want their kids coming here every day, and that's a big shift that's impacting our teachers. Before, we didn't have as much community support, so this program has shed new light on what we're doing here and what we can offer kids. We're a public school with a waiting list in every grade level, which is not that common. Parents are more supportive of what teachers are doing. My eight years here have changed so drastically. It's really been amazing to see this transition.

iLeadership3 answered,

It's challenged the way that they teach. A lot of teachers are traditional in that they want to teach in the same way that they learned, and that makes them feel more comfortable in how they're teaching. So, it's definitely challenged the way that they write their lessons and how they're assessing their students, the way they

look at the data, the way that school can be a technologically advanced place for the future graphic designers and future game designers. That's what we feel we're capable of here, and we've got to be sure that what stands out here is the way that we're using the technology effectively to inspire and educate our children. So, we have to keep pushing ourselves so that we don't become stagnant. It's constantly challenging us, or maybe I'm speaking on my own here, but I do look for these innovative ways we can use the technology in order to better instruct our students, engage our students, and move them forward.

On a related note, subquestion 5a specifically asked iLeadership to describe how the 1:1 initiative had impacted iTeachers' lesson planning and implementation, if at all. iLeadership all felt that there had been changes to both. iLeadership1 explained that their lesson planning and implementation had become more systematic and thoughtful over time, thus making the process easier for them:

It adds a bit more work to the lesson planning itself, but if they take the time, it makes their implementation that much more valuable and effective. The delivery of the lesson is so much more natural. So, there's a give and take; they do the work on the front end so that they can reap the rewards on the back.

iLeadership2 also described the shifts for iTeachers in lesson planning and implementation:

They used to have a lesson plan template to fill out, and we went through it and realized that, given the resources, the plan was so separate from what they were actually doing in the classroom. It wasn't meant for teachers in our school, with our technology. So, now, teachers send us their presentations for their students that they've designed before they actually teach with them. Now, they're

spending much more time and thought on what they're putting before their kids each day and what they want the students to be able to do, so there's been a shift there. Filling out the lesson plan was taking up time that they now use to reflect on their work. They're thinking about their role in the classroom.

Everything that teachers create, presentations and videos, is shared with the students. This lets their students go back to any and all resources on the iPad, take notes, annotate, and everything. In terms of implementation, they're definitely more interactive in the classroom with students. They're not talking at students, just standing in the front of the room and delivering instruction. It's got them to be more interactive. We see much more engagement, so that's changing how teachers lesson plan and teach. The technology really lends itself to that.

iLeadership3 had previously discussed the changes and, once again, emphasized the need to move forward, adding,

It's just now so easy for them to share their lessons and ideas with each other, and they've got a world of resources available to them now to find and share. We don't want students to be in sit-and-get classrooms. We want them to have opportunities to manipulate the content and show what they know, so that's most important.

When prompted to provide any additional comments that they'd like,

iLeadership1 declined while iLeadership2 and iLeadership3 offered more commentary on the program. iLeadership2 stated,

This has helped us shift from school as we know. Our staff now feels that by any means necessary, they'll work until our kids are successful. I feel like we've been able to grab on to students who were very reluctant, who weren't successful, and

we've changed things for them. The same kids who didn't want to read now go on their devices and find an eBook to read or practice on an app or website. It's great to give them these opportunities to want to learn, to want to come to school, to want to read. Our technology is helping them love school, and I'm excited about that.

iLeadership2 said, "I feel proud of what we've done. I feel that we are capable of more, a lot more, and I look forward to us going to the next step."

The transcripts of each interview were sent to and reviewed by each iLeadership participant, who offered no changes to their previous responses as reported in this section of the results.

Summary

The results for this study included five different sources of data, two forms of archival data from iElementary's school district and from a local university along with this researcher's iTeacher survey, iTeacher interviews, and iLeadership interviews. Multiple sources of data were included in this case study in order to give a clear picture of the singular case of iElementary's work. Case study research was employed as a means of deeply understanding real-life phenomenon (Yin, 2006). This case study used multiple data to bring to light the viewpoints of different individuals (Tellis, 1997). A case study for this research served to discover whether or not any causal variables come to light that will promote future research in related studies in which initial research is insufficient or nonexistent. The results of the case study outlined in this chapter from all five data sources were analyzed and evaluated continuously throughout the research process through the lens of the four research questions. Those analyses, emergent themes, and their implications are detailed in the final chapter, Discussion.

Chapter 5: Discussion

Introduction

The purpose of this study was to examine teachers' perceptions of the possible impact of 1:1 iPad integration at iElementary on teaching and learning. Educational research surrounding the work of teachers in 1:1 environments is lacking; that, along with the rapidity with which technologies change, make it both difficult and necessary to study and understand the potential pedagogical impact of 1:1 teaching. The theoretical framework of this research was based on the literature reviewed, including 21st century teaching and learning, instructional technology integration, and 1:1 computing initiatives. Examining iTeachers' perspectives through archival and baseline data, the iTeacher survey data, and the iTeacher interview results provided insight into the implementation from those involved daily in the 1:1 environment at iElementary. iLeadership contributed to this research by answering interview questions in order to validate the experiences and perceptions of the iTeachers with respect to the 1:1 iPad program.

The results of the data collected for this study were analyzed throughout the research process, ensuring accuracy, the understanding and recognition of themes, and the review and relating of those themes to the four research questions. Kvale and Brinkman (2008) reported that organizing data in manageable, logical chunks facilitates a researcher's interpretation and leads to a better understanding of the data. The themes that presented themselves throughout the analyzation of data were categorized under the research questions in order to answer them.

Summary of Results

Emergent themes regarding pedagogical changes throughout the 1:1 iPad were identified as a means of answering Research Questions 1 and 2. Three main themes were

identified in the research: the progression of use, student-centered thinking and practice, and ease of planning. The archival data, the research reported from a third party, cited a shift in the use of the iPad since the beginning of implementation from what to how; iTeachers reported that their focus had moved from what the iPad could do to how the iPad could be used to improve teaching and learning. The iTeacher survey results showed that the iPad was in use daily, sometimes several times a day, in order to research, plan lessons, manage students, and access resources. Using the iPad to teach and present to the students occurred daily as well, sometimes several times a day, as the majority reported that they did this and found it very easy to do. Frequent technology users “place considerably more emphasis on developing students’ 21st century skills – specifically, skills in accountability, collaboration, communication, creativity, critical thinking, ethics, global awareness, innovation, leadership, problem solving, productivity and self-direction” (Grunwald & Associates, 2010, p. 15). The iTeacher survey results indicated that the progression of use had developed into support for instruction and an integral part of specific teaching strategies.

iTeachers also noted pedagogical changes throughout the 1:1 program in terms of evolving into student-centered thinking and practice. Existing practices were altered as the iTeachers discussed the collaborative opportunities that 1:1 technology afforded the students. The abundance of technology also facilitated differentiated and individualized instruction, tasking iTeachers with the challenge of thoughtful and deliberate planning of appropriate technology integration based on students’ wants and needs. Combined with student-centered approaches to learning, the technology-rich learning environment can positively affect student learning while developing 21st century competencies (National School Board Association, n.d.). The shift to student-centered thinking and practice

required a transition of ownership to the students, letting go and giving the students the independence that a 1:1 classroom could provide.

While all five iTeachers indicated that there were pedagogical changes throughout the 1:1 initiative, two of the iTeachers did quantify those changes as being small.

iTeacher3 and iTeacher4 attributed the perceived small changes in their pedagogy to having taught in technology-rich environments, unsure of how they would engage learners without some technology in the classroom. However, the pedagogical change that iTeacher3 noted involved planning and technology becoming symbiotic over time, unable to plan lessons without including the technology integration. iTeacher4 also commented that using technology had become the way of teaching, especially the use of iPad apps for lessons.

iTeachers cited that the 1:1 iPad program impacted the ease of lesson planning over time. As Blake (2008) asserted, any activity without adequate pedagogical planning – technologically enhanced or not – will produce unsatisfactory results with students, even if it is attractive from a multimedia point of view. iTeachers began planning their lessons around the 1:1 approach, giving students more opportunities for choice and voice in how they showed their learning. As their comfort levels with the technology itself rose, their effective use of the iPad and understanding of its capabilities as an instructional resource made lesson planning both easier and faster. iTeachers explained that having a 1:1 ratio of technology to student facilitated their organization in terms of managing student progress and utilizing instant achievement data to inform their planning and instruction. The iPads afforded them the resources necessary to research, to access digital content, and to collaborate and share materials with their colleagues.

In response to Research Questions 1 and 2, the shifts in iTeachers' pedagogy were

identified as their progression of use, student-centered thinking and practice, and ease of planning. iLeadership interview responses showed that from their observations, there had been a mindset shift since the beginning of the initiative. iTeachers had become more reflective and collaborative in their practice, shifting the way they teach and think about teaching. iLeadership asserted that iTeachers had become more student-centered, adapting their role in the classroom to become that of a facilitator as they began creating learning experiences that incorporated student collaboration and ownership. iLeadership described that there had been phases of pedagogical shifts from transforming current practices to innovating them through the seamless integration of the iPad in their daily work. The observations of iLeadership confirmed the iTeachers' perceptions and the themes that emerged from the data.

The findings related to Research Question 3, "What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills," detailed the perceived impact on the learners at iElementary. The 2011 Baseline Assessment, which served as archival data, gave a view of preimplementation perceptions and predicted outcomes of the 1:1 iPad program. Before the iPad program began, all teachers at iElementary reported the frequency at which students were engaged in their classrooms; 77% claimed that their students were often engaged, while 33% felt that there was frequent engagement. The Baseline Assessment data also showed that the teachers predicted the impact of the then upcoming 1:1 initiative; 67% expected increased student engagement; 38% anticipated improved student achievement; 24% envisioned more student motivation in their classrooms; and 19% looked forward to building students' 21st century skills/readiness. Through this archival data, teachers at iElementary expressed a need for and an expectation of more engagement in their

classrooms once the iPad initiative began. All comments indicated an expected potential impact that would be positive for the students. It is possible that these future iTeachers' positive beliefs about the impact of the 1:1 iPad initiative influenced their adoption of technology use in the coming years.

The results of the other archival data, the third-party research report from 2014, revealed four themes related to Research Question 3: accountability, communication, active learning, and student engagement. Interviews and observations led that researcher to report improved student performance and assessment and reporting with the 1:1 iPads. Communication with colleagues was enhanced through the use of the iPads. Students at iElementary were seen and reportedly known to be active learners, creating and working at their own pace. With increased opportunities for active, differentiated learning, student engagement was also increased.

The iTeacher survey and interview discoveries also supported their perceived shifts as a result of the 1:1 iPad initiative. The themes that emerged from the data include student engagement and attention, responsibility, and achievement. iTeachers claimed that their students used the iPads with excitement and enthusiasm, impacting their approach to learning and their willingness to be actively engaged. This excitement and enthusiasm for learning showed the presence of student engagement, which occurs when students make a psychological investment in learning. They try hard to learn what school offers. They take pride not simply in earning the formal indicators of success (grades), but in understanding the material and incorporating or internalizing it in their lives. (Newmann, 1992, p. 2)

The iPad became a “thinking tool” that helped them show their critical thinking in far more ways,

increasing engagement because of immediate excitement, control, and interactivity, allowing transfer of engagement into other aspects of the curriculum, increasing classroom teaching and learning when intrusive routines can be minimized, and increasing the likelihood of completion of academic work during out-of-school time. (Jacobs, 2010, p. 22)

Students at iElementary were found to be more responsible in their own learning, taking ownership of it and developing their digital citizenship through the use of the iPad for creating, presenting, and discovering. iTeachers noted a shift in student achievement in terms of their retention and their ability to truly show their learning.

The iLeadership interview results produced similar themes: accountability, engagement and motivation, and responsibility. In their observations, iTeachers had established student-centered learning environments in the 1:1 setting which provided both flexibility in and ownership of their learning through the integration of the iPads. This heightened sense of responsibility in students led to better engagement and motivation in the classroom. Instant feedback both at home and at school supported student progress and allowed iTeachers to accurately gauge their students' wants and needs. These themes were interconnected in their perceived impact of the 1:1 iPad program for the future-ready learners at iElementary.

In Research Question 4, the researcher sought to identify which factors influenced iTeacher self-efficacy. As theory and field research implied, various factors could impact teacher self-efficacy with respect to technology integration (Albion, 2001), which logically would be of considerable importance in a 1:1 environment. The results of the data brought to light themes that relate to theoretical studies regarding teacher self-efficacy in technology-rich environments: frequency and types of use, attitudes about

technology, beliefs and perspectives on the benefits and challenges of the program, and training and support from leadership. The archival data provided by the 2011 Baseline Assessment, showed that teachers at iElementary used technology more frequently at home than at school. That was due to, according to leadership, a lack of both devices and training. Before implementation, very few new devices and mostly older technologies were accessible at iElementary. Newer technologies were not widely in use and were personal property of the few teachers who did utilize them.

The frequency and types of use over time improved with giving 1:1 access. In the iTeacher survey, participants indicated that there was daily/several times daily use of the iPad at school, mainly for delivering instruction. The survey results also showed that iTeachers use the iPad every day, some several times a day, for the purposes of research, lesson planning, communicating, managing students, accessing resources, and teaching/presenting with the iPad. In interviews, both iTeachers and iLeadership alike explained that comfort levels with the technology improved over time, with increased frequency in use and varied types of use as perceived indicators.

Attitudes about technology in general were revealed in the iTeacher survey, the iTeacher interviews, and the iLeadership interviews. iTeachers expressed positive views about technology, citing the global connectivity that it could provide. Technology has changed our world and all its varied cultures and perspectives to be smaller, more relatable, and closely connected (Jacobs, 2010). iTeacher3 and iTeacher5 expressed realistic views of technology today, one describing how quickly technology was outdated and the other explaining dependence on technology and the potential backlash when it failed. iLeadership was also positive about technology in general, particularly if leveraged properly to its fullest extent. Interviewed iTeachers all felt that technology

does have a place in the classroom, adjusting the role of the teacher to be more of that of a facilitator and enforcer of expectations in order to manage technology use, promote online safety and ethics, and maintain high on-task time.

iLeadership attitudes about technology, specifically about the 1:1 program, were captured in their interviews. As iLeadership plans and implements support and training for teachers at iElementary, it was important to understand their perspectives on technology. iLeadership was positive about the 1:1 program, especially with technology flattening the world for their students and making learning both real and relevant. iLeadership3 cautioned that the technology must be utilized to its fullest potential in a 1:1 scenario, a view which hinted at a desire to dive in more deeply in order to innovate iTeacher planning and implementation.

The perspectives of iTeachers and iLeadership on the benefits of the 1:1 program also had connections to iTeacher self-efficacy. iTeachers were pleased with the quickness and convenience of using the iPads in class with every student, seeing their learning, and providing instant feedback. Having the technology readily available made it easy for iTeachers to adapt their lessons based on the students' needs. The program was forcing iTeacher1 out of a comfort zone, transforming teaching and learning as it had always been known to him/her. iLeadership cited benefits around seeing and knowing what students know; building relationships; and improving communication, collaboration, and productivity.

The challenges of the program that iTeachers and iLeadership noted in their interviews gave insight into their perspectives and experiences, which could have impacted their attitudes and self-efficacy. Staying ahead of the curve in order to diversify learning experiences for the students and continuously increase engagement was a

challenge in their initiative, along with management and balancing traditional, nontech and tech-integrated activities. iLeadership also mentioned that management and balance were challenges, as teachers in their tech-rich environment had to learn to determine instructional appropriateness to support teaching and learning in a natural way.

A critical component to building program buy-in and teacher self-efficacy in the 1:1 program at iElementary was training and support. The survey and interview data indicated that there had been ongoing, differentiated, in-house training opportunities in which technological and pedagogical skills were enhanced simultaneously. iLeadership had empowered their own teachers to become self-driven, collaborative participants in their own professional development opportunities, both formal and informal. Frequent, bi-monthly training sessions provided refinement and advancement of iElementary teachers' skills in purposefully planning and utilizing technology in the classroom. iLeadership² indicated the significance of training and support by explaining that a challenge had been to find and make the time to work with new and beginning teachers at iElementary in order to go beyond establishing a baseline of understanding in terms of 1:1 iPad integration.

Implications of Findings

The findings of this research were consistent with the theoretical framework of the study and the supporting literature that existed in the field at the time. The beliefs, attitudes, and experiences of iTeachers reflected future-ready teaching and learning in a changing world. The significant role of the teacher and its evolution in technology-rich environments were evident. As the literature suggests, teachers have the greatest impact on student achievement (Jupp, 2009). Teachers play a pivotal role in student education and in the overall success of instructional technology initiatives, such as 1:1 computing

(Digital Education Revolution NSW, 2010). The evolution of technologies and their place in the classroom require both pedagogical and psychological shifts by the teacher, typically followed by a higher level of technology integration (Digital Education Revolution NSW, 2010). The work of iTeachers to adjust their mindsets, skills, thinking, and practice implied a gradual progression had taken place at iElementary, shifting their lesson planning and implementation to promote a student-centered learning environment.

As mentioned in Chapter 2, a highly significant variable in any initiative is the teacher and the factors surrounding his/her experiences, abilities, and willingness to implement new programs (Darling-Hammond, 2002). As 1:1 computing technologies grow, teachers are charged with adapting their pedagogy and building their own capacities with respect to technology integration. Factors impacting the successful technology integration of the teacher are both intrinsic and external. Teachers must have the right approach (a positive view of technology, a commitment to lifelong learning, and a clear understanding of thoughtful lesson planning and implementation utilizing technology) (Darling-Hammond, 2002). If teacher beliefs do not shift in support of instructional technologies, the integration will not fully occur (Dexter et al., 1999, as cited by Di Benedetto, n.d.). The findings of this research support the assertion that these factors have impacted iTeachers' approaches to lesson planning and implementation. Their positive outlooks about and experiences with 1:1 technology integration implied their willingness to organize, plan, and instruct utilizing the iPads with their students.

The support of iLeadership implied the prioritization of the success of the program, the teachers, and the students at iElementary. Almost overnight, teachers at iElementary received 1:1 access to iPads. All too often, district or school administrators have placed computers in teachers' rooms with the expectation that computers will

become part of the teachers' instructional repertoire, even though the teachers did not ask for them and did not have specific plans for using them (Cuban, 2001). The support system provided for teachers throughout the implementation process is paramount (ongoing and relevant professional development, a shared vision, guiding leadership, and a collaborative community that promotes reflective practice) (Mumtaz, 2000). The findings of this research suggested that there was a strong support system for teachers at iElementary.

This study helped advance research methodology in phenomenological case studies of 1:1 initiatives. As other schools evaluate, consider, plan, and/or implement a 1:1 program, the literature, the findings, and their implications should be reviewed and discussed. Reports such as National School Board Association's (n.d.) recommend investing in technology for the potential positive impact on teaching and learning, explaining that the implementation of technology increases the likelihood of teachers presenting more complex material and tasks. This same report asserted that technology use in classroom can support the role of teacher as coach, build educator self-efficacy, and provide motivation for students in terms of risk-taking, trying more difficult tasks, and fine-tuning their own work (National School Board Association, n.d.). While this case study was that of a unique phenomenon, there were lessons learned through the data collection, data analyses, and reporting that supported the literature at the time. The findings could lead to changing the way in which future 1:1 programs are designed and developed.

Discussion on Limitations of Study

The small number of willing and eligible participants in this study was a limitation that could have affected the findings. While the archival data originated from a

large sample (the entire former faculty and leadership at those times), the iTeacher survey and subsequent interviews were a smaller sample. Having more participants could have produced more themes and possibly more contradictions to the literature. The eligibility criterion did limit the number of participants as well; however, the researcher was interested in collecting data from teachers with teaching experience prior to the initiative who had remained a part of the program through the time of the study.

Multiple sources of data were used for data analyses and reporting. The archival data were not collected by this researcher and were not from the same sample. Although the archival data were included in order to paint a clearer picture of preimplementation and earlier stages of the initiative, the reliability of others' work as well as its inclusion for the sake of validity were limitations in this study.

Discussion on Future Directions of Research

In light of the findings and the limitations of this study, the researcher recommends further study of the phenomenon at iElementary, including participation from more faculty members. Further research could provide other evidence of pedagogical changes; philosophical adaptations; and beliefs, attitudes, and self-efficacy of the teachers at iElementary over time. Penuel (2006) concluded the importance of research syntheses as a means of periodically reviewing extant research on 1:1 in order to provide policymakers, educators, and researchers with the key implications discovered from a range of studies. As the program evolves, this researcher recommends studying concepts along the same lines: What shifts do iTeachers perceive? How does iLeadership address the changing needs of its faculty over time? How will potential turnover in staff impact the program? What changes, if any, happen with the types of technologies available to them in the 1:1 environment? The findings and implications of this study

along with the current literature and selected theoretical framework call for extended study over time at iElementary.

Extending this study to other populations would also be beneficial in bringing to light the perceived pedagogical impact of 1:1 environments. iLeadership3 stated that as the only elementary school that is 1:1 with iPads, it was always a challenge to pinpoint where they were expected to be in terms of growth and development of the program. Without a comparison, iElementary stood alone in its work, at times, unsure of how to meet its mission and put its vision into practice. Lessons learned from iTeachers could and should be compared to the experiences and perspectives of other teachers at other schools in 1:1 programs.

Conclusions

The findings of this research pointed to a variety of integration factors that impact teaching and learning in a 1:1 iPad school. The data laid the foundation for further research of iTeacher perceptions in the coming years in order to fully understand overall shifts, if any, to iTeacher pedagogical beliefs, technological abilities, and levels of technology integration. As technology in education continuously evolves, practice and research need to be ongoing, paving the way for advancing future-ready classrooms through a better understanding of the common threads that weave together ideal student-centered, future-ready teaching and learning situations for our students. This research serves as one pebble in the winding road that is research on technology in education, 1:1 initiatives, teacher self-efficacy in technology use, and pedagogical shifts within technology-rich environments. There is much to be explored along this road and though it stretches for miles beyond our vision, this researcher is ever hopeful of a continuous journey toward progress.

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Appendix A

Procedural Steps, Rationales, and Timeline

Procedural Step	Task	Rationale	Complete By
Step One	Gather archival data collected during the first semester of year 1. (Baseline assessment, research report submitted by a third party summarizing the data from surveys and focus groups).	Use multiple sources of data for triangulation. Compare perceptions from midway through year 1 to current perceptions.	March 2012
Step Two	Research 1:1 surveys and interviews and gather survey items and interview queries related specifically to the research questions that can be adapted.	Align measurement tools to research questions.	March 2012
Step Three	Request permission to use and adapt survey questions from Laptops for Learning.	Ensure ethical use of resources.	April 2012
Step Four	Draft an online survey and interview questions.	Develop a draft of adapted questions for review and revision.	April 2012
Step Five	Form a review committee of six people in the field of education to review draft.	Validate use of survey and interview questions for the purpose of this study, and assess clarity of the measurement tools.	May 2012
Step Six	Discuss draft with committee members, and revise the draft based on their feedback.	Seek outside feedback in order to revise existing drafts of measurement tools.	June 2012
Step Seven	Provide access to study information (District Research Application Form) and online survey for all eligible iTeachers in order to solicit participation and begin gathering data.	Adhere to ethics and district protocol by providing details of the research. Solicit participants to give their input.	August 2014
Step Eight	Email survey questions and individual responses to each participant for review, approval, and possible addenda.	Validate responses from participants, and seek clarification as needed in an effort to minimize inaccuracies in data analysis and interpretation (Creswell et al., 2003). Allow participants to be collaborative, valued members of the study (Kvale and Brinkman, 2008).	August 2014

Step Nine	Input survey data into qualitative analysis software from Researchware, HyperRESEARCH, to begin organizing responses and looking for themes.	Use qualitative analysis software in which to input data for organizing. Allow the researcher to gain some prior knowledge of iTeachers' perceptions (Kvale and Brinkman, 2008).	September 2014
Step Ten	Prior to conducting interviews, reevaluate the themes revealed in the analysis of survey responses. Compare to the original interpretation of themes from survey results.	Allows the researcher to reflect on the data throughout the analysis and collection processes, as typical in ethnographical qualitative research (Hammersley and Atkinson, 1995). Allow the researcher to gain some prior knowledge of iTeachers' perceptions (Kvale and Brinkman, 2008).	September 2014
Step Eleven	Brief participants, conduct and audio record interviews, and debrief.	Ensure participants' comfort with the interview. Adhere to ethics, and ensure participants' understanding of interview protocol. Allow participants to share any other final thoughts during debriefing (Kvale and Brinkman, 2008).	October 2014
Step Twelve	Transcribe interviews using qualitative analysis software from Researchware, HyperTRANSCRIBE, cross-referencing the audio recordings to ensure accuracy.	Use qualitative analysis software in which to input data for organizing. Check transcripts against audio recordings for accuracy.	October 2014
Step Thirteen	Email transcripts to participants for review, approval, and possible changes.	Validate responses from participants, and seek clarification as needed in an effort to minimize inaccuracies in data analysis and interpretation (Creswell et al., 2003). Allow participants to be collaborative, valued members of the study (Kvale and Brinkman, 2008).	October 2014

Step Eleven	Code emerging themes that are found in the data.	Organizing data in manageable, logical chunks in order to interpret and to better understand the data (Kvale and Brinkman, 2008).	November 2014
Step Twelve	Restate and describe themes that emerge.	Facilitate interpretation of themes for analyzation.	November 2014
Step Thirteen	Review and relate themes to the research questions and purpose of the study.	Facilitate interpretation of themes for analyzation under the framework of the study in order to best answer the research questions.	November 2014
Step Fourteen	Examine and compare themes across interviews and survey results.	Triangulate data for validity and reliability.	November 2014
Step Fifteen	Find and record any possible emerging similarities and patterns based on teacher variables (e.g. years of teaching experience, subject or grade level taught).	Understand common ground in perceptions amongst participants in their unique environment.	November 2014
Step Sixteen	Compare archival data and researcher-collected data for differences and similarities.	Understand past perceptions to current perceptions in order to report if any changes exist. Use multiple sources of data in order to validate research findings (Yin, 1984).	November 2014

Appendix B

Survey of iTeachers

Project Name: The Perceived Impact of 1:1 iPad Implementation on Teaching and Learning: A Pedagogical Study
 Sponsoring Organization: Gardner-Webb University
 Principal Researcher: Amy Neaves Todd
 Telephone: (###) ###-####
 Project Location: iElementary

Participants Rights and Assurances:

I have received a copy of the approved [school district's name] Research Application Form for the afore mentioned research project. Having thoroughly read and reviewed the application I am familiar with the purpose, methods, scope and intent of the research project.

If I am willing to participate in this research, I understand that during the course of this project my responses will be kept strictly confidential and that none of the data released in this study will identify me by name or any other identifiable data, descriptions or characterizations. Furthermore I understand that I may discontinue my participation in this project at any time or refuse to respond to any questions I choose not to answer. I am a voluntary participant and have no liability or responsibility for the implementation, methodology, claims, substance or outcomes resulting from this research project. I am also aware that my decision not to participate will not result in any adverse consequences or disparate treatment due to that decision.

I fully understand that this research is being conducted for constructive educational purposes and that I voluntarily participate in this project.

Participant's Full Name:

This information will not be shared in any results. Participants will be listed as iTeacher #.

Position:

Home Address:

This information is on the [district] agreement form for research purposes and is never to be revealed.

Please indicate your willingness to participate in this study.

- I am willing to participant in this research project.
- I am not willing to participate in this research project.

General Information

Grade level (-s)/Subject area (-s) taught:

Number of Years in Educational Service (in any state or district):

Please include the current school year. Type a whole number (1,2,5,7) with no alphabetical text.

Number of Years at your current school

Please include the current school year. Type a whole number (1,2,5,7) with no alphabetical text.

Are you currently certified in this state to teach at your current level?

- Yes
- No

Are you a National Boards certified teacher?

- Yes
- No

Technology Benchmarks for Staff

These were developed pre-implementation by iElementary and introduced during year one of implementation where:

Level 1: This level of performance is deficient; none of the requirements for the benchmark are complete; no evidence of the required skills can be found; the standard is undone.

Level 2: This level of performance is below average; deficiencies in the standard exist; the assignment is incomplete; the required skills displayed are inadequate; lacks care and effort.

Level 3: This level of performance is average; meets all the requirements of the benchmark but does not extend beyond; the required skills displayed are adequate, reasonable care and effort are shown.

Level 4: This level of performance is exceptional; everything is impressive; the teacher has exceeded the requirements of the assignment; the required skills displayed are superior; it is apparent that the teacher has spent an extraordinary amount of time to complete standard and go beyond the requirements.

Please rate yourself honestly on each of the following technology benchmark for staff

Please rate yourself honestly on each of the following technology benchmarks for staff

Benchmark 3: Technology Integration with iPad 2

	Level 1	Level 2	Level 3	Level 4
Teacher and his/her students use the iPad 2 daily.				
Teacher creates meaningful lessons that allow students to utilize the iPad 2 for at least 50% of the school day.				
Teacher integrates the iPad 2 with web pages, software, documents and Keynote presentations.				

Teacher creates lessons/activities that allow students to create various products as a means of demonstrating understanding.				
Teacher also utilizes apps in order to allow students to practice various skills as they work towards mastery.				
Teacher plans the usage of apps via lesson planning and monitors that students are on task and utilizing appropriate apps during the instructional day.				
Teacher trains students on how to properly use and care for the iPad 2.				

Please give details on your efforts to meet Benchmark 3:

Teaching & Learning with iPads: Classroom Use

Adapted from Boston College's Laptops for Learning survey:

http://www.bc.edu/research/intasc/researchprojects/L4L/pdf/l4l_teacherSurvey_year2.pdf

From <http://www.bc.edu/research/intasc/researchprojects/L4L/L4L.shtml>

How often do you performed the following tasks with the use of the iPad?

	Everyday	Several times each day	Several times each month	Several times overall
Use my iPad at school				
Use an iPad to deliver instruction to your class				
Create tests, quizzes, and/or other assessments on the iPad				
Create media presentations for your class				
Create handouts for students				
Create & manage lessons, assessments, and/or anchor sets of student work				
Use an iPad to differentiate instruction				

Use an iPad to help manage students				
Take still and/or video pictures in class				
Use the iPad to help students better understand a concept				
Access on online community (discussion board, blog, etc.)				
Participate in an online community (discussion posts, blogs, etc.)				
Access media files or web resources for lesson planning/teaching units				
Access podcasts or online media/resources during a lesson				

Self-Efficacy: Comfort Level with iPads

How easy has it been for you to use the iPad in order to:

	Very easy	Somewhat Easy	Somewhat difficult	Very difficult	Not applicable
deliver instruction to your class?					
access digital resources for lesson planning and preparation?					
communicate electronically with students' parents/guardians?					
communicate electronically with colleagues at your school?					
create digital content/materials for your students?					
present to students?					
explore educational apps in the App Store?					

Please rate how easily you can perform each of the tasks listed.

Please reflect on your ability to use the iPad in order to:

	I can do this easily on my own.	I can do this, but sometimes I need help.	I often need help to do this.	I cannot do this at all.	I've never been taught how to do this.
organize and plan teaching units					
create handouts using Pages					
create presentations in Keynote					
build spreadsheets in Numbers					
create assessments on the iPad					
send and receive files via the Mail app					
locate resources for your students on the Internet					
create/maintain a website or blog					
create multimedia files (movies, etc.)					
video yourself teaching or a student presenting					
add information to a wiki or discussion board					
use the iPad to differentiate instruction for diverse learning needs					
use the iPad to assist ESL students					

use the iPad to assist students with learning disabilities					
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Perspectives on the iPad

Questions are adapted from IV. Impact of Technology from the STNA via UNCG's SERVE Center & DPI

In the setting where I work with children...

For each item, choose the response that best matches how much you agree with the statement. If you have enough information to form an opinion but are split between "Agree" and "Disagree," select "Neither Agree nor Disagree."

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
My teaching is more student-centered and interactive when the iPad is integrated into instruction.					
My teaching practices emphasize teacher uses of the iPad to support instruction.					
My teaching practices emphasize student uses of productivity apps on the iPad, e.g. word processing, presentation.					
My teaching practices emphasize student use of the iPad as an integral part of specific teaching strategies, e.g. project-based learning, cooperative learning.					
Using the iPad has helped my students become independent learners and self-starters.					
The iPad has helped my students work more collaboratively.					
The iPad has increased my students' engagement in their learning.					

The iPad has helped my students achieve greater academic success.					
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Perspectives on the iPad II

Questions are adapted from One to One Computing: A Summary of the Quantitative Results from the Berkshire Wireless Learning Initiative (JTLA Volume 9, Number 2 · January 2010, Damian Bebell & Rachel Kay)

Based on my observations...

For each item, rate the impact of 1:1 iPad implementation on students based on your perception.

	Greatly improved	Improved	No impact	Declined	Greatly Declined
engagement/interest					
students' motivation					
quality of work					
ability to work independently					
participation in class					
ability to retain content material					
interactions with other students					
behavior					
interactions with teacher					
ability to work in groups					
preparation for class					
attendance					

Other observed areas of impact:

Appendix C

Alignment of iTeacher Survey Questions to Research Questions

Research Question	Survey Sections
One: Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive?	Teaching & Learning with iPads: Classroom Use Self-Efficacy: Comfort Level with iPads Perspectives on the iPad
Two: Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation?	Benchmark 3 Self-Efficacy: Comfort Level with iPads Perspectives on the iPad
Three: What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child?	Perspectives on the iPad Perspectives on the iPad II
Four: Based on the experience of iElementary teachers, which factors influence teacher self-efficacy?	Teaching & Learning with iPads: Classroom Use Self-Efficacy: Comfort Level with iPads Perspectives on the iPad

Appendix D

Alignment of iTeacher Interview Questions to Research Questions

(Questions are adapted from Pamela Livingston's research on 1:1 Learning: Laptop Programs that Work & Nancy I. Foote's dissertation)

1. How do you feel about technology in general?
2. What place (if any) does technology have in the classroom?
3. What role does the teacher play in technology integration?
4. How do you use the iPad in your classroom?
5. How often do you use the iPad in class?
6. How do you feel about every student having an iPad in the classroom? Why?
 - a. What benefits have you observed for your students using iPads?
 - b. What benefits have you experienced from using the iPad?
 - c. What challenges have you experienced integrating the iPad in the classroom?
7. Describe the support and training opportunities that you've had this year with respect to the iPad.
8. Thinking of your practice as a teacher, what changes/adaptations/philosophical adjustments have you had to make now that iPads are part of teaching and learning in your classroom?
 - a. How has 1:1 iPad use in the classroom impacted your lesson planning? Lesson implementation?

Research Question	Interview Question
One: Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive?	4, 5, 8
Two: Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation?	4, 5, 8
Three: What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child?	6, 8
Four: Based on the experience of iElementary teachers, which factors influence teacher self-efficacy?	1, 2, 3, 5, 6, 7

Appendix E

Alignment of iLeadership Interview Questions to Research Questions

(Questions are adapted from Pamela Livingston's research on 1:1 Learning: Laptop Programs that Work & Nancy I. Foote's dissertation)

iLeadership

1. How do you feel about every student having an iPad in the classroom? Why?
 - a. What benefits have you observed for your students using iPads?
 - b. What benefits have you experienced from using the iPad?
 - c. What challenges have you experienced integrating the iPad in the classroom?
2. How do teachers use the iPad in their classrooms, based on your observations?
3. How often do teachers use the iPad in class, based on your observations?
4. Describe the support and training opportunities that teacher have had with respect to the iPad.
5. Since the beginning of this initiative, what changes/adaptations/philosophical adjustments have teachers made with the iPads as part of teaching and learning in their classrooms, based on your observations?
 - a. How has 1:1 iPad use in the classroom impacted teachers' lesson planning? Lesson implementation?

Research Question	Interview Question
One: Throughout the 1:1 initiative, what pedagogical changes, if any, do teachers perceive?	2, 5
Two: Based on teacher perception, how does the 1:1 iPad initiative impact the teachers' lesson planning and implementation?	2, 5
Three: What shifts, if any, are observed in student engagement, student motivation, and the development of 21st century skills in the future-ready child?	1, 5
Four: Based on the experience of iElementary teachers, which factors influence teacher self-efficacy?	1, 2, 3, 4

Appendix F
Debriefing Statement

Thank you for your participation in this study. The purpose of this study is to examine your perceptions of the possible impact of 1:1 iPad integration at iElementary on teaching and learning during the first three years of implementation. The theoretical framework of this research is based on the literature reviewed that includes 21st century teaching and learning, instructional technology integration, and 1:1 computing initiatives. Examining your perspectives will provide insight into the implementation from those involved daily in the 1:1 environment during the school's 1:1 iPad program.

Your participation is not only greatly appreciated by the researchers involved, but the data collected will pave the foundation for further research of iTeachers' perceptions in the coming years in order to fully understand overall shifts, if any, to iTeachers' pedagogical beliefs, technological abilities, and levels of technology integration.

If you have any questions about this study, please contact me:

Principal Researcher: Amy Neaves

Telephone: (###) ###-####

Email: _____@_____.com

Thank you so much!

Appendix G

iTeachers' Interview Transcribed Responses

(Questions are adapted from Pamela Livingston's research on 1:1 Learning: Laptop Programs that Work & Nancy I. Foote's dissertation)

<p>1. How do you feel about technology in general?</p>	<ol style="list-style-type: none"> 1. I believe is the way of the future. Half of what the kids are able to do now most adults can't do. When they grow up and join the workforce, they'll be thoroughly more beneficial to their companies and being able to communicate through technology, whether it's through business deals or presentations for the company, they'll be an asset if they can learn with technology. When they get here [in kindergarten], you know this is just second nature to them, so they need to have technology in the classroom. I know as far as for me, as a teacher, I want to take them places they normally wouldn't be able to go and to do things, like be able to create a presentation in the Keynote app and import picture to show what they've learned. 2. I like using technology. I feel like it puts the world at your fingertips. I feel like it's really neat to have it personally and in the classroom. It's just very helpful to be able to look things up and see what's going on in the world. 3. I believe it affects all of our lives, but I get frustrated by it more so because you get it and almost immediately, it's old, like a car off the lot, so when I get any new technology, I get excited, but then something new comes out, and I wish I had that. That is been frustrating for me. 4. In general, I think it's great. I think it's a way to integrate things kids are exposing in everyday life into the learning environment. It's definitely taking learning to the next level. 5. I actually think that it is good because it is a great way for her to be connected to the world easily. We live in a society that's global, and we are constantly changing, and therefore, the technology helps you stay on top of it. You're always able to find out what's going on, so there's just no excuse
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	<p>not to be involved in society, so I like the technology. Now, I do have to be honest. Sometimes I get tired of the technology, you know, because it does have its drawbacks. It is a little addicting and dependent, so therefore when it shuts down, it kind of throws off your day a little bit, but really, technology is not bad thing.</p>
<p>2. What place (if any) does technology have in the classroom?</p>	<ol style="list-style-type: none"> 1. I know a lot of times it's facilitating the teacher as well as the unit because I have to use it as a model for the kids. It is all about adjusting, walking them through all the steps of how to do this and how do that until they're confident and want to move on by themselves. Also, when we're pulling our groups, the kids are able to do assignments on the iPad that have been individually assigned, so it's on skills that they needed or are lacking in, maybe needing a little extra support. Technology, like the iPad, helps us as teachers identify their skill levels based upon assessments given to them and to individualize instruction for the students, getting each child exactly what [s/he] needs, which for teachers is hard to do and and keep class running smoothly. 2. I use it a lot in my classroom. I think that it fits into any subject that we teach whether it's using the whiteboard or the iPads there's easily a place to plug it in throughout the school day in any subject area. 3. I think that it definitely has a place. I think that every classroom needs to have some technology, whether it's a SmartBoard or iPads even just the enhancement system, but I think it's just one tool of many that make them successful, and by successful, I mean student achievement and growth, so I don't think it's an end-all be-all. I think that you can still have success without it but where we are in terms of students before they even get to us, they live with technology and want it in their hands because they had that home. They definitely

	<p>have to have it in the school. It's sort of like hundreds of years ago with the slate. That was the new tool. Now, we have a new tool that kids are really expecting when they come to school, and I feel like parents expect it from the schools. If you go to open house and you see just a chalkboard or a dry erase and a bunch of textbooks, that would be pretty alarming. I want my kids to go to a school and have technology so that they'll be prepared for the future.</p> <p>4. I think it has a huge place in classrooms. There are a lot of benefits if it's incorporated correctly, and it's not just given to kids with no input. It's great if Internet safety is taught, if how to correctly use the apps and the different resources is taught in a way that makes them educational, I think it has a huge benefit.</p> <p>5. Specifically, in my classroom, it helps, once again, because we are a society that's constantly changing, so it actually has helped the students to be more involved with what's going on. They have it right there at their fingertips, so they can literally go and find out about current events and other things that are constantly changing and evolving as well as help building and growing our society. So, I think technology within the classroom just opens up more opportunities for our students in general and helps keep them connected to the world.</p>
<p>3. What role does the teacher play in technology integration?</p>	<p>1. The teacher's really the facilitator. You can't expect a kid to have an iPad or have a MacBook and just able to go on and learn. They've got to be taught how do you look things up, how do you integrate the technology with library books and different resources to really get the most benefit out of it. I think also the teacher's important in tying in the technology into the classroom. It's bringing that home environment in, since most of the kids have access to a smartphone at home or their parents have laptop, or they get to go to the public library</p>

	<p>if they don't have technology at home, so bringing in that outside world into the classroom makes school more engaging, and teachers have so many different outlets and ways to use the technology for learning.</p> <ol style="list-style-type: none">2. I think you definitely have to be very explicit on what you want kids to do and model how you need to use it. You have to think about what is the best way to use it. You can't just let kids go willy-nilly, you know, because it'd be a disaster. So, you have to teach them your expectations, show them what you want with different projects and that sort of thing, so the teacher has to be heavily involved throughout the process.3. I think the teacher is the most vital part of its success. You could put 50 iPads in the classroom, you can have a Smartboard in the classroom and all the technology pieces in place, but if the person using the tool is not competent in utilizing the tool, it'll be used inappropriately. So if a teacher isn't trained appropriately or the teacher isn't willing to learn or the school isn't willing to put forth the effort into educating the teacher in how to use it appropriately, then it would fail. The teacher is the most critical part.4. The teacher's really the facilitator. You can't expect a kid to have an iPad or have a MacBook and just able to go on and learn. They've got to be taught how do you look things up, how do you integrate the technology with library books and different resources to really get the most benefit out of it. I think also the teacher's important in tying in the technology into the classroom. It's bringing that home environment in, since most of the kids have access to a smartphone at home or their parents have laptop, or they get to go to the public library if they don't have technology at home, so bringing in that outside world into the classroom makes school more engaging, and teachers have so many different outlets and ways to use the technology for learning.
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	<p>5. Well, in my class, I integrate the content with the technology piece, so it's not just just technology. I'm still doing content work in reading and math, and science and social studies, just using the technology as a resource at an added bonus. A teacher could take something as simple as a SmartBoard in the classroom if you have, using a computer, using an iPad, and be able to have that piece of technology to connect to information.</p>
<p>4. How do you use the iPad in your classroom?</p>	<ol style="list-style-type: none"> 1. We still have to use some paper and pencil at this level. In the lower grades, we have to teach penmanship, show them how to hold a pencil, and the basics things that should've been taught to them before kindergarten. We use some apps to work on using their fingers to form letters as well as identifying letters and their sounds, but holding a pencil is something important that we have to show them how to do. The students take notes on their iPads, make presentations, take pictures and videos, and use apps to help them learn to read, write, and think. 2. We use it a lot for creating. In the beginning, we used it for apps to get on to practice different skills, but now we use it more for creating things to explain our thinking in math and take pictures of our work. We give them the notes in reading and math on their iPads so that they can follow along and take notes so they have everything right in front of them and can mark and delve deeper into what we're reading. 3. Well, we use them every day in every way, from morning to the afternoon. It was used in the beginning as more of a way to get the information that I was presenting to the kids to help them focus a little bit more, but I know that our team, we really moved away from that, and we use it much more as productivity tool, and I don't mean like glorified worksheets! Our kids really did make their own graphic organizers, their

	<p>own slideshows to organize their thinking. It's a great way for us to see what they are learning and how they are learning it, and especially with the productivity piece, I can see easily where their misconceptions are. We use it for research, so Science and Social Studies time are really good to give them problem-based learning projects, and they just run with it, which is nice. It's nice to have to tool there. We learned how to use QR codes, and in grad school, I learned how to build webquests, so that helped guide their research since the kids can go anywhere on the iPad. We use it for homework by putting a video of ourselves in there, so it's similar to if they went home and watched Khan Academy videos for math, but it's more personalized because it's us. We drop the video in, explaining what they have to do, so there aren't a bunch of questions because the instructions were there for them and their parents to know what to do. That helps us save time as a team to divide the video creation up and create different videos for different days. I have the kids video me at the summary of my lessons so they can watch and rewatch them at home. That's helpful to the students and also the parents who may not know what we're working on in fourth grade.</p> <p>4. I use it daily, without a day that goes where we don't use it for something. I use it for everything from the guided part of my lesson. It's more like a follow-along, where the kids could workout problems with me. They have the template, the graphic organizers, and resources all there in front of them. Also, an important part is the creation piece, so I've taught a lesson, and now, I want you the student to take it to the next level given guidelines, some parameters, or a template that's set up for them to download it, and then, you're showing me what you wanted to create about what you've learned.</p> <p>5. I use my iPad with my students several</p>
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	<p>different ways. We use different apps and different online programs that help work on different standards as well for research projects, for creating, for communication, and for critical thinking in all content areas. With the technology, the kids are able to work on those 21st-century skills using the iPad. I'm able to send information to them instantaneously as well as receive information back from them, so that's how it's used with my students.</p>
<p>5. How often do you use the iPad in class?</p>	<ol style="list-style-type: none"> 1. We use the iPad about 50-60% of the day. We do take some time for them to adjust to school in general at the beginning of the year, and then, they start off with the iPad just for small portions of the day, and each day, we use them a little bit more and more. It's got to be a good mix for lower-grade students so that fundamental skills are still taught. We want to be able to set them up for success using the technology, which has been a huge asset to the classroom. 2. About 75% of the day. We use it every day. We use it in reading and math every day. In science, we go back and forth because sometimes, we're doing hands-on experiments that don't really need as much technology. 3. I'm going to take away from their Guided Reading time with me because we use actual paper books, so I'd say probably about 75-80% of time during a school day, we use the iPads in class. 4. About 70% of the time 5. It's pretty much used every single day. In the 45-minute block that I have students each day, they use the iPad probably 40% of that time. Once I do an introduction, they break off into their groups and complete the assignments, whether it's researching, creating, or documenting their learning through the use of the iPad. In my class, technology is constantly in use by me and by the students.

<p>6. How do you feel about every student having an iPad in the classroom? Why?</p>	<ol style="list-style-type: none"> 1. I like it. I do tend to have one or two kids that get more distracted, but sometimes, it helps them focus. Others are just going 50 miles an hour constantly,, and they generally have a hard time focusing on one thing at a time. They need extra attention, whether or not the iPad is in their hands. Other than that, I think it's very important. I think we're going to look for schools to be able to provide these opportunities to prepare kids for the future. We're definitely lucky to have them. 2. I think it's great for every student to have an iPad; however, there are some students that I think need to be monitored a little bit more than other students. There are some students that need to sit close to me and sometimes, I need to take it up because it's a distraction, but for most students, I think it's great for them to have one-to-one access all day every day. 3. Every student should have an iPad and have access to it. I would first say that it is the sheer number of them, of having a one-to-one program that I like because if I would only have five iPads, I think it would've created such a challenge for me in deciding who gets the iPad and when. I think if you could have the iPads, the ratio needs to be one-to-one. In my class, having one-to-one makes things easier because my expectations are much clearer, showing students what's expected for this project or this part of the day or this lesson, and this is what's expected of you; this is how you can use the iPad. It's made organizing and planning so much easier, and then I just think it's best to have equitably in the classroom, putting an iPad in the hands of each student. 4. I love it! I love that every kid here has an iPad. I think it makes the learning much more engaging and more meaningful. They all have the ability on the spot to do some kind of creation or some type of electronic poster of what they learned that they
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	<p>wouldn't be able to do if they didn't have the technology right in front of them because you've got to reserve the computer lab and you can only go maybe once a week for 45 minutes. Students really can't learn these 21st-century skills, learn how to do word-processing, and learn how to make presentations. Everything that we do here, while I'm not explicitly teaching how to make a presentation, how you write a document, or how to make a bar graph, through choice and exploration, it's incorporated into the learning. Our students are gaining skills that they'll need for high school, for college, and for their future jobs. We're really preparing them by using the technology daily.</p> <p>5. It's a good opportunity for kids to be given an iPad because we do work at a Title I school, so a lot of the students would not have the opportunity to have certain technologies actually in their lives outside of school. So, having the opportunity is a good thing, but it also has his limits. We are an elementary school, so when they do leave us to go on to middle school, they're not leaving with the iPad. They won't have the information and the skills being in a classroom that doesn't have the technology piece, so that will take some adapting. I think it's hard sometimes when our technology may fail in the classroom, and I have to go back and go old-school unfortunately, sometimes without the technology, and that's hard for the students, too. You're not always going to have technology everywhere.</p>
<p>6a. What benefits have you observed for your students using iPads?</p>	<p>1. I'm just thinking about when I was here seven years ago compared to now, we had a lot of kids struggling. The way we deliver the lessons or the lessons themselves in general have changed. I think it's really adding that piece of technology in that's provided a lot of engagement and retention. The iPads have given them something to</p>

	<p>hang onto and to remember. They can now show me their learning and use the iPad to explain things that they might not have remembered if they hadn't created something on the iPad about it to explain to me. I definitely see a difference in their performance from before.</p> <ol style="list-style-type: none">2. I think that they think a little bit more, especially when they do projects in ComicLife, they're able to show their thinking. I can see it in their projects, even though I can't get to every individual student, I can actually see their thought process, and they can explain their thinking on the iPad. They're also able to collaborate more. They're much more engaged because it's not just paper and pencil work, and they don't have to complete their projects the same way, which keeps them engaged in what they're doing.3. There's definitely been an increase in engagement. There has also been an increasing sense of responsibility, and I know that you're going to ask me about the challenges. Our biggest challenge is that you have to teach them how to be how to be citizens, how to be responsible digital citizens so it took conversations to a new level. We have to teach them how there are consequences online and how to use the technology appropriately. It definitely was a struggle because we had a lot of things that we didn't expect until we started from the program. When they get engaged, which is exciting and they love doing everything on the iPad, but then there was this line that they would try to cross, so I actually saw a benefit of this challenge because I'm able to teach them another whole idea of rewards and consequences in a completely different way than we'd ever done in school before. When you are a citizen, this is expected. There are people who watch your computer, who know your IP address, and you do have a responsibility as an adult using technology so it's just on a different level
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	<p>for kids. Instructional engagement but also digital citizenship are both aspects that we had to start teaching them here at school that we hadn't before. That's a huge benefit even though it's a challenge.</p> <ol style="list-style-type: none"> 4. I think one of the biggest benefits is engagement. They have that tangible object in their hands and are constantly able to create and manipulate using the iPad versus being bored with worksheets, tapping their pencil on the desk. They're actually focused more so with the iPad and the MacBook than if we didn't have them and use them. 5. I have noticed that some kids are more prone to paying attention, being more focused in the lesson, being excited about using the iPads to learn. It's hard trying to find that balance of not draining them with the iPad, with the same apps all the time. You have to mix it up a bit, but they really do enjoy learning with it.
<p>6b. What benefits have you experienced from using the iPad?</p>	<ol style="list-style-type: none"> 1. I think just in getting out of my comfort zone. It'd be probably easier for me to go back to my old-school way of teaching, but when I see the kids' excitement and engagement, I know that I just need to keep working toward becoming better and better with my technology use with students. 2. I honestly use my MacBook more than my iPad because for me, it's just easier to plan and create, but everything syncs and sends to their iPads, so what I create transfers to their iPads. 3. I get to see them thinking, their creativity, and tapping into their different learning styles. You have kids who want to create a graphic representation, and some of the kids wanted to rap a song and put it into their recording devices, so I like that. It's also much easier to organize and keep track of work, so instead of having a bunch of pieces of paper that I had to file and that students had to go back through, we're creating digital files and can store them all in one place. A huge benefit of it, too, is

	<p>when I have parents come in, to show their work, we get out their iPad and see what they've been doing. Also, a huge benefit is the ability to communicate with home and school, using the iPad, using instructional videos, because parents had never been able to do that before. They had to have called if they had a question. I know that using Class Dojo, which is a classroom management tool, we can easily let parents know about students' behavior and go back and forth via email instantly. These things used to interrupt the day, having to stop and call, whereas now we can easily send the information out to parents. It's help build a sense of a relationship between the parents and teacher and the student. That was a benefit that I definitely didn't foresee happening when we started this program.</p> <p>4. I like the quickness of it in a sense. I can give you an assessment, you can turn it in to me through, and it's all electronic. That way, I can see your progress and give you immediate feedback. It's so easy to share your work with our parents or email different things, so the convenience factor is important. One of the things that we're trying to push this year is using videos to flip the classroom, so I may have taught you something, but now you have your iPad at home, so if you have the Internet, you can watch this video that I've attached your homework and can watch the video at home. Parents can watch the video with you and give us a way to incorporate school and home and bring it all together.</p> <p>5. The biggest benefit is just the convenience--being able to have that technology piece, being able to find information quickly and easily, and being able to manage and adapt to situations more easily in the classroom. Let's say I'm teaching one lesson, and then, I find out that from the teacher that they are on a different standard this week, having that piece of technology makes it easier to adjust my lesson quickly. I have to change</p>
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	<p>the way of thinking and researching, looking at the books and other materials to fit what you're learning, so the iPad gives me more freedom.</p>
<p>6c. What challenges have you experienced integrating the iPad in the classroom?</p>	<ol style="list-style-type: none"> 1. For kindergarten, the challenges have been the steps because it takes several steps sometimes to go from one activity to the next, or one lesson to the next. Sometimes, there are multiple steps for them, and it's not just one click and they're ready to go. They're learning the technology as their learning all of their other skills, but a lot of our kids want and need step-by-step directions, which takes a lot of time, especially at first. 2. Just trying to stay ahead of the curve. You can only use an app for so many projects. You have to try to figure out new and creative things that they can do, so it's kind of time-consuming to explore some of those things and different ways that they can do their work. That's pretty difficult. 3. Getting the kids to an understanding of what the expectations are and what's right or wrong has been a huge challenge. Things are great with the iPad, but there has to be a consequence. So, when an iPad is taken from a student because of behavior as a negative consequence, it's then up to us as teachers to figure out how kids will learn when we're so used to having the iPads, and there's then a whole behavioral systematic that has to be in place, which was unexpected. Another big challenge is when technology fails. You just always have to have a backup plan to know what you're going to do it. If they have to share with somebody because theirs isn't working, then the responsibility is on the student with a functioning iPad to do the work. Rewards and consequences are both challenges for students since they all want to have their own iPad. 4. I think that management is a big challenge, especially if you don't set your expectations

	<p>early on, because students might go on websites that might not be blocked and are inappropriate. There's an app that we've been using, and we learned that students are able to set up chat rooms, so we keep learning things as we move on and try to educate the students on responsible use. There's a lot of freedom that they have with the technology, so it's really important to set those expectations for students with consequences whenever necessary. We have to continue to work on the loopholes that might pop up so that we can keep students safe online and teach them how to properly use their time for learning.</p> <p>5. The challenges are when the technology isn't accurately working all the time because if your system is down and your whole lesson is technology-based, you have to change the way you're gonna teach it and still get that concept across. Another challenge is that some kids enjoy the iPad but not always as a learning tool. They may want to be on a site because it's fun and not because it's educational. I could see it as a distraction because they have a little bit more freedom that other people do. Sometimes, technology use does backfire, but you have to find that balance and have a good management system in place.</p>
<p>7. Describe the support and training opportunities that you've had this year with respect to the iPad.</p>	<p>1. I can definitely say that training has not been an issue. Our school does very well supporting its teachers with technology. We have a technology facilitator here, and he provides tech Mondays for us, and it's not optional. You go during your planning time, and he showed us something that we already have but just as a refresher, or he'll introduce new apps or sites. Typically, if we were left on our own, we would just be doing same thing everyday, so this time allows for some creativity and keeps things from getting too stagnant in the classroom. Knowing that we'll have teacher or staff days with carousels and rotate through</p>

	<p>training sessions gives all of us opportunities to learn how to do a variety of things with the iPads and then be able to help the kids with that as well. So, we have had a plethora of opportunities for in-house learning technology throughout this process.</p> <ol style="list-style-type: none">2. [The district] provided several trainings in the beginning, but now, we have our own in-house trainings. I think we only know what we need for using the iPads on an everyday basis. We have empowerment sessions I think every other Monday, and [our TF] shows us a new website or a new app or a different way to use our technology.3. Okay so we have had Apple come out several times, which is awesome. They always bring something new to the table as far as what you can do with the iPad, how you use iMovie, how to get the best use of it, and then just interesting things, like how to get a webpage onto their iPads in read-only mode so that students without Internet access can still get the resources that they need. Then, Mr. Miller also has his empowerment sessions so he can bring something new to the table twice a month that is empowering teachers and students to continue to use technology more and more effectively. This just enhances the work of the forever-learner. We can't just think that we've got everything we need. There's always something new to learn. We work on making our flipcharts and activities more engaging and interactive with the kids, like adding videos and voiceovers and such, which is always good.4. We've had a lot of training. The district came in at the very beginning and did the initial trainings with us to get us started. We started with the basic functionality of the iPad so that we'd be comfortable with it. Basically, we learned this is how you update, this is how your sync, this is how you connect to WiFi, and all of those
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	<p>things. Since then, the trainings have become more differentiated as the need and use have grown. We offer different sessions that you can go to. Administration does a really great job of picking staff based on their strengths to give trainings to everyone. For new staff, we have those basic sessions so that they can catch up if they have no background on the technology here. We want everyone to be on the same page, but over time, we learned to offer more options for different needs.</p> <p>5. We do a lot of professional development here. We've had some Apple people come in during the summertime. We have some workshops where we talk about the technology, and then, sometimes, you just learn by taking it home and exploring it yourself. You just have to play with it to really get comfortable with what you are doing. We do a lot of empowerment sessions where they teach us to integrate different types of apps and websites that will help students.</p>
<p>8. Thinking of your practice as a teacher, what changes/adaptations/philosophical adjustments have you had to make now that iPads are part of teaching and learning in your classroom?</p>	<p>1. I think that, again, it's outside of my comfort zone. There's more planning ahead that you have to do, but the students can move at their own pace. If I was teaching the old way, students might just read a book or wait for the whole class to finish, I have increased on-task time by planning ahead and setting expectations for students. Once they finish one activity, they can move right on to the next, so I have to be ready for that by planning ahead and knowing what it is that I want students to do next in order to scaffold their learning. For some students, the concepts didn't click before, but with technology, they're able to get things much more quickly, so I have to be ready to move them and push their growth.</p> <p>2. I think I've had to let go a little bit more just because different students might show their thinking and learning in different ways from how I had envisioned, but letting them</p>

	<p>have creative power instead of saying that it has to look or be like this or do this, as long as it has the elements of what I asked for in the requirements. I have to allow them to take ownership of that a bit more. It's kind of changed.</p> <p>3. The biggest change is just in terms of lesson planning. I'm thinking about, ok, this is the lesson idea, so how can I make it better because I have the technology, or here is the piece of technology I've been given so how can I best use it to meet this standard. That's changed for me. It's become a symbiotic relationship. I don't think that I think of the technology and then the lesson plan or the lesson plan and then the technology. It just depends on sort of what's coming out and what we're talking about. I wouldn't say that I have had any big philosophical adjustments because the instructional technology was a huge part of my undergraduate and graduate programs, so I expected to have technology when I entered the classroom. I was very lucky to have technology provided for me at my first school and then here. I've just never been without it, so I don't feel like I've made any real philosophical adjustments. In terms of planning and managing a classroom, there were big changes having the one-to-one iPads because your expectations change along with your delivery. Since technology in general was part of my education, I felt ready to use it and adapt as needed.</p> <p>4. It's tough because I only taught for one year at another school and then came here. So, I feel like if I was to now go to a school like my first one that doesn't have technology, I don't think I'd know what to do because this is really all I know. My first year of teaching, I had an overhead projector in my classroom, and that was it. I can't even imagine that now. It's become the only way of teaching for me. If I were to leave here, it'd be a game-changer because I'd have to struggle for those ways to engage my</p>
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	<p>students and keep things interesting because I wouldn't have the apps that we use for projects and such. I'd have to switch from digital work to paper again and create hands-on activities to involve them.</p> <p>5. I think I could definitely do more with the technology. I feel like I've barely touched the surface with it. I'm just trying to make it a point to use it, to make the students and myself aware that it is a resource, that it is a tool. Even though we have the iPad, it is not a make it or break it. If they're not here, we have to know that this is just one resource. While you have it, you need to use it because it can bring different resources that are not available to everyone, and so I want to take advantage of it. I'm not used to students teaching me or showing me how to use technology, but with all of the apps out there, they figure them out and teach me how to do things on the iPad sometimes.</p>
<p>8a. How has 1:1 iPad use in the classroom impacted your lesson planning? Lesson implementation?</p>	<p>1. At first, it was hard for me, and I was tempted to go back to my old ways without the iPads. Now that I've adapted, I definitely feel confident in what I'm doing. I'm able to plan more quickly now and do more with the kids every day. We can move through lessons so quickly now because I can teach, give them practice, and assess instantly, instead of waiting for me to hand back papers and look over their work to choose the next steps. The students are now creating more with the help of technology, and that has been something that I've loved seeing. Seeing the students' growth, I can see that it's working.</p> <p>2. It has changed a bit because now we have to send the students our lessons to their iPads, and before, we would type up our lesson plans in a Word document that the kids never see, but now they can get it on there, access the resources for the lesson and follow along. I think it's actually made lesson planning a little bit easier because I don't have to sit here and type up one thing</p>

and then come together to get all the texts for the lessons. I can give it all to them everyday cohesively. With minute-by-minute details on their iPads, it's made things a lot easier to have them gain easy access to a website or an activity in going to sketchbook, so it's helped with some things like that, too. They've become more engaged this way. It lets me be able to float around more and let them work in their groups to accomplish tasks. I can walk around and see what they're doing while they work at their own pace.

3. I know that the change has been thinking about how can the iPad be used most effectively in the lesson. We try often times to force it in instead of thinking, oh, that's the best way to do it. We have to take the time to find the best use of it and not force anything, and that will be beneficial to you and especially beneficial to the students, so just thinking it through, not just feeling the need to use the iPad and putting a worksheet on it just so the kids can use them. To me, that's the trap some teachers fall into, not thinking outside the box or taking a little more time of their lesson planning to instinctively think about technology integration. I think that it's something that you know as a teacher, as a school, we really could really be improving in, lesson planning with technology integration. Sometimes, the teachers think that the technology integration portion of the lesson plan template is just using the lesson plan with the students, but that's just a glorified textbook. The students aren't using the technology to learn but just to follow along. We need to challenge ourselves in how to keep students using the iPads effectively and often. We have to move forward with the technology, making it truly about productivity and personalizing learning effectively without being very time consuming. That can be overwhelming for a lot of us.

	<p>4. I think it's made it easier. When I think back to my previous school, if I had printed out copies of something but the kids weren't ready or need something different, there was no adjusting your plan and changing things up, but here, when I teach something and it doesn't quite work, the students just aren't getting it, it's so much easier to tweak it and change a few things around and keep going with it until they do get it. You can adjust the lesson to what the kids really need. In this past, this was my plan, and I didn't have the resources to change it to match what the kids needed. Even with small groups, if I've got a student who doesn't understand, I'm able to tell right away because I can see their work. I've got their results so quickly that I can go back and adjust what a student needs to get it. Without the technology, you've got to stop, take the time to grade 25 papers, then look at how the students did and make those decisions on what the kids need. That takes time that we don't have. Lesson planning is so much easier because of being able to share and collaborate across the grade level with other teachers. We can break up by subject area and each teacher on the team write lessons for that subject to share with the grade-level team. You can take your team's lessons and tweak them for your students so you're not starting from zero. It really makes collaboration easier for us. It also just gives us more ways to get to the kids. I may teach it one way, and it doesn't work with a student, so I use your way, and then, I can use the Khan Academy videos, so we have three ways to try to reach students because they have access to the technology as do we. It gives us teachers more in our arsenal, so that definitely helps.</p> <p>5. The iPad has made it easier now. I can retrieve more lesson plans and resources online. I can research with it more easily and go paperless. It is definitely been a great way to stay organized, so it's been</p>
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	<p>very beneficial with my planning and implementing my plans within the classroom.</p>
Additional Comments?	<ol style="list-style-type: none"> 1. I'm thankful to have the support. I need someone to help me, even be on call, just in case I don't feel comfortable. Our administration team and other faculty are teaching me new things all the time and also helping me with things that I forget how to do. It's great having that support and that help right across the hall if I need it. The administration is behind us, the district is behind us, so I'm glad that we have the support that we do. 2. no 3. no 4. no 5. When we started this 1:1 program, I didn't think that our students would be able to keep them. I didn't think they'd use them as an academic tool. I thought that they'd think they were toys because they hadn't had much technology at all before. I was shocked at how the students gradually enjoyed learning like they hadn't before. They want to use the iPads for research and to create. They want to build and do things with the iPads. I thought we as teachers would have to be constantly looking over their shoulders to see what they're doing, but come to find out, we have very responsible students. We just had to give them the resources and trust that they'd use them in the right way, and they have. It's been really nice to see that.

Appendix H

iLeadership Interviews Transcribed

<p>1. How do you feel about every student having an iPad in the classroom? Why?</p>	<ol style="list-style-type: none"> 1. I think it's a spectacular thing. I think that some type of device, whether it be an iPad or some other tablet, should've been in our school years ago so that their education is relevant to modern society. 2. I love it. I love the fact that every student has access. I've seen great benefits in our students using them for instructional purposes. Students these days come to use having already been exposed to technology, so it's great that they have opportunities every day to learn in an environment that matches that of their worlds outside of school. 3. If we're going to be a 1:1 school, every student has to have an iPad. Whether it's used effectively is quite a different thing. If it's done properly, having an iPad in each student's hand is crucial, but it has to be done properly or else, it's a waste of time. The tool is only as good as the person using it. It's got to be used effectively; if you do, it's amazing, and if you don't, it's ordinary.
<p>1a. What benefits have you observed for teachers & students using iPads?</p>	<ol style="list-style-type: none"> 1. Instant feedback is a big benefit. Using some of the apps allows teachers to instantly gather student assignments electronically and provide feedback, whereas teachers used to collect their papers, take them home, grade them, and give them back the next day. Some students have also been able to have conversations online with their teachers about homework after school hours, so when students are struggling with homework, they can get immediate help from their teachers. In the past, teachers have had to wait until the next day to give feedback or to help with homework. 2. Motivation has been a biggest benefit. Prior to the 1:1 implementation, there were kids who were reluctant learners and didn't want to come to school, and that's definitely changed. Kids can now show us their learning by creating products in whatever way they want. In areas such as math and science, we've been able to use the iPads to bring the outside world in and make learning real, and that has had a big impact on our students. Teachers now have many more resources for use with students, such as all the apps that they're using. It's made teaching and learning easier and more efficient. They're getting much more comfortable

	<p>finding a balance and working toward having student-centered classrooms, acting as facilitators as the kids progress at their own pace. Letting go of some of that control and actually learning from the students has helped both students and teachers. There's been such a shift for teachers. Using the iPads is something that's so different from the way they were taught. As long as teachers are purposeful in their planning, having this technology makes everything so much easier for them once they embrace it.</p> <ol style="list-style-type: none"> 3. I've seen students engaged--more engagement. Students have been able to show what they've learned in many more ways, which is what we want. We don't want the cookie-cutter way of presenting. We just want to know what the students know. The iPad lets them present in different ways, such as a podcast, a slideshow, a song, a comic. There are so many different ways that they can show us what they know, and that's the number one thing.
<p>1b. What benefits have you experienced from using the iPad?</p>	<ol style="list-style-type: none"> 1. It works well with my ADD, so it lets me easily multitask. I've not taught with the iPad, so my personal experience has been more about using it for productivity and for exploring apps to share with teachers. I wish that I had had an iPad when I taught in the classroom. 2. I think that my biggest level of benefit coming from the use of the iPad has been relationships. It's great as a member of leadership to walk into a classroom and have students show me something new on the iPad that I didn't know. We are learning from them, and the connections, the communication has really strengthened because we can talk about teaching and learning with this great tool. I love that I get to explore different apps and resources and then share those with students as well, so we're teaching and learning together. That new dynamic is something that I truly appreciate. 3. Really, it's forced the teachers to think more about their instruction and to be more deliberate in their planning and instruction. It's been a great benefit to me to see the teachers rethinking how their students are going to learn. As I said before, the students are now so engaged in using the technology. We live in

	<p>a digital world, and many of the students use technology outside of school all the time, and so it's great having the students transfer those skills. They do have a real skill set that they've developed in school. It allows the students to feel successful, and it allows them to use the skills that they already had. With regards to the resources that are now available to us, it's just opened so many avenues to getting the resources that we need to develop students' skills.</p>
<p>1c. What challenges have you/others experienced with the iPad?</p>	<ol style="list-style-type: none"> 1. Management, managing how they utilize the iPads. Some teachers may at times want to fall back into a digital-worksheet mindset when they think that, because it's on the iPad, it must be good, instead of planning the use of the iPad for creating, generating, and synthesizing knowledge. It's also tough to manage what the students are doing when they're not looking, which is no different from any other tool that you might be using in the classroom. When you give students math manipulatives at first with no instructions, what are they going to do? They're going to play with them instead of using them as intended. That continuous monitoring is a challenge for teachers. It was perceived by some initially that they could give them the iPads and that the students would make good choices and be responsible with them. Students will sometimes make bad choices regardless, and with the iPad, sometimes teachers forget that. 2. I think it's in finding a balance in a blended learning environment. There have to be opportunities for students to hold a pencil and write on a piece of paper. End-of-grade tests are still conducted via paper-pencil, so we have to prepare them for those experiences. We have to help teachers know that it's important to find that balance and that it's okay to have that balance, to not always be expected to use technology in their classrooms, especially if it's not appropriate for the task. No one here will ever come down on a teacher for using paper and pencil for rigorous tasks. The devices don't have to be used 24/7, and we want teachers to know and expect that. There's a time and a place for everything. One of our challenges in leadership is to find the time to dig in deep with our

	<p>beginning teachers who need extra support, who haven't been with us since the inception of the 1:1 program, and we can't forget to provide them with the support that they need to become comfortable with the technology and use it. [A local university] now requires its students to use iPads, so many of our new teachers coming from there already know the basics and can use them for productivity. We're fortunate to have that, to have student teachers and beginning teachers coming to us who already have that foundation. For other teachers coming to us from other locations, it's a challenge for us to find and make adequate time to work with them, to meet their needs, and to build their understanding from the beginning, which I think is essential to their success. Sometimes, hiring happens right before school starts, and teachers at any school in that case have to hit the ground running, but here, there's the added challenge of having 1:1 technology in the classroom. Our summer program is set up to help new teachers to [iElementary] become more acclimated, but the hiring process may impact that schedule and create a sense of urgency for new teachers at times. We haven't had much turnover since we started the program, but we want to ensure that all of our teachers feel supported and get what they need. Time can always be a challenge.</p> <p>3. As the first 1:1 iPad elementary school in the state, we've had trouble looking for someone to compare ourselves to in our work. Are we moving at adequate speed? Are we making the progress that we should be making? We've had no one to compare to, so that meant at times that the support from the district wasn't there or was very limited. We had to trail-blaze on our own, which even though it's a challenge, it's a very positive thing as well. The other challenge is to ensure that we don't become an app school. We don't want apps to drive the instruction; we want the learning to drive how we use the technology.</p>
<p>2. How do teachers use the iPad in their classrooms, based on your observations?</p>	<p>1. They use them in a variety of ways. Unfortunately, the same teachers who used to use worksheets are now using them for basically digital worksheets. That is the easiest option, and it takes the least management, planning, and work for teachers.</p>

	<p>Good planning and teaching continue to be good after the iPads were given out. There are teachers who've gone from good to great by creating videos and having students gather what they've learned and present it as a comic or a video or a published writing of some sort, and that's what we keep pushing and encouraging teachers to do, to work toward the creation side of things.</p> <ol style="list-style-type: none"> 2. There's a wide range. Initially, when teachers come in, they simply try to replace what they already want or plan to do with the same thing but on the iPad, so there's not really much change. That's part of the process. It's just a phase, as we've now learned. So, we are understanding of that. Then, there comes this transition that we notice where they realize that they can do so much more with the iPads and allow kids to take more ownership in the learning, because they can. They have the resources to do so. That's part of our vision here, having students show their learning. 3. We're at a point now that it's become so embedded in everything that we do. It's so natural now with students uploading and downloading their own work and all of the resources out there for them and being able to create with their learning. It's so organic. However, I'm going to be brutally honest, if we're not using the technology to its limits, then we're not pushing our students to theirs. Our students are capable of so much, so I want to push the limit. I want to get them into coding, to start developing their own apps. We should be pushing them every day. There's a danger in falling into a trap of students downloading texts, manipulating them, and sending them back to the teacher. That's basically a digital worksheet. As an administrator, I try to work with them and show them, model for them, that there's so much you can do for and with your students. I want us to keep moving forward and avoid those pitfalls, avoid falling into that trap.
<p>3. How often do teachers use the iPad in class, based on your observations?</p>	<ol style="list-style-type: none"> 1. Between 50 and 80%. You know, some of it's based on their comfort level with the iPad, and some of it is their comfort level with classroom management and how well they can handle and plan for using them with students. 2. I would say probably 70-80%, I see iPads being

	<p>used in classrooms. I'm in and out of classrooms all day, and I see them in use much more than I'd expected. The kids take the iPads with them to their Specials--to music and art--and they're using their iPads there as well. So, that's why I say that the kids are using the iPads 70-80% of their school day.</p> <p>3. All the time. It's a blended environment, so even if they're writing notes in a notebook, they still have and use the technology to accompany their work, to use whenever they need it, and they do, because they carry the iPads to every class. I can't imagine our students going to a traditional school now. It would drive them crazy because they're so used to constantly having that tool around. The first few years, when our fifth graders left and went to middle school, they were lost. They didn't have any sort of device to use. They were very disengaged at school. Now, the middle schools have tablets, and even though they're not the same kind, our students can transfer their skill set and continue to find success in the way that they know best--using technology.</p>
<p>4. Describe the support and training opportunities that teachers have had with respect to the iPad.</p>	<p>1. As far as formal training, we've had some wonderful sessions by Apple. We've now moved out of the Apple catalogue and into Apple-designed support and coaching based on our needs and wants now as we move forward and use the iPads more effectively and more creatively in the classroom. We have trainings every summer for new teachers and for those who want remedial help. That's a 2.5-day training on both the iPad and the Macbook so that they can use them together, learning how to retrieve files, how to manage folders, all those basics. During the course of the year, we continue to do bimonthly empowerment sessions to work with all teachers on how to better use the iPad, on new apps, on using the interactive whiteboard, and so on. At the beginning of the school year, we have Tech Wednesdays where we look at all of the tech resources beyond basic functionality, since we have teachers at different levels of technology use and comfort.</p> <p>2. We start of in the summer with our new or beginning teachers. We have empowerment sessions because we want our teachers to feel and</p>

	<p>be empowered. Every other Monday, they meet with our Technology Facilitator, and he may be showing them something completely new or a new way to use what we've already had but in a more effective way. We've had outside consultants from Apple come in to provide trainings as well. We strategically group teachers and have them rotate through a variety of sessions together. We're very deliberate about how we group teachers for professional development because we don't want teachers to attend sessions on things that they already know, so we want to move them to the next level as they get more and more experience with the iPad. Some things we didn't even have to train the entire staff on because in our leadership meetings, we'd explore something with a few teachers, and then, we'd ask them to go experiment with whatever it is. Our teachers are intuitive and perceptive, so when they saw these few teachers doing something new, they wanted to know what it was and how to do it themselves. So, some of that happened without formal instruction or introduction, which is exactly what should happen. Once the buzz was out, we could refine it and come up with other ways to use that concept instructionally.</p> <p>3. We got some fundamental trainings from the district when we first started. When we learned things like how to double-tap on the home button to see all of the apps that were open, that was incredible. I still remember that and tell that story, because that's where we were! We were amazed then by just the basics, and now, look at where we are! So, we then got some support from Apple, but we soon realized that, if we wanted to really move forward, we needed to look from within. We used the train-the-trainer model with our own staff tech team, working with Apple for two days, and then, those trainers would come back and work on what they'd learned. We'd use half-day teacher work days for professional development, and we'd split [the trainers] up based on one aspect of what they'd learned, and they'd train the teachers. Within the school, we found that we had both the expertise and the desire, and the teachers learned more because it was coming from a colleague in their building, so</p>
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	<p>we got more buy-in to our PD. The teachers who were presenting had to become experts in what they were training on, so it was really a win-win situation for everyone. We still have Apple PD yearly because we want to keep moving forward with regards to the iPad.</p>
<p>5. Since the beginning of this initiative, what changes/adaptations/philosophical adjustments have teachers made with the iPads as part of teaching and learning in their classrooms, based on your observations?</p>	<ol style="list-style-type: none"> 1. It seems like a revolving door of change because at the beginning of the initiative, teachers came in with blind optimism, thinking that the iPad was going to be an amazing resource, whether they said it or not, they walked in with that mindset, that it was going to make their lives so easy. Then, reality set in, and they realized that there's so much work involved in doing this and doing it well, no longer believing that they should do this because it was so hard. Then, it shifted back to an understanding that if they plan correctly, if I really set up the framework at the beginning, it is much easier in the long run. It's been a shift from the quick-fix mentality into a process mindset. When teachers move into that process mentality, thinking through their lessons, their excitement come back about using it again, and you can see that grow as they're refreshed and invigorated by this. They see that it's not ridiculous amounts of work and that the results are worth the growth pains. It actually can make life easier; it's just a different version of easy than they were expecting. 2. I think that the mindset of our staff has really changed. It seems really different from that of teachers at traditional schools. We are truly building a collaborative culture here, and the iPads have helped with that. Teachers are coming together on their own and having these in-depth conversations about instruction. It's also helped with creating a sense of pride for our teachers, and for our students as well. Teachers are excited to come here and to be here every day. Are we perfect? No. Is there room for growth? Always. But since this initiative, I feel like we're well on our way. Teachers are constantly evaluating their work, and we're always looking, as leadership, at ways to tweak things, ways to make things easier for them, ways to make things better for our kids; these are now schoolwide conversations, not just in terms of leadership. It's

	<p>been a huge shift in our school culture. Our parents are more involved. They're now excited about our school and want their kids coming here every day, and that's a big shift that's impacting our teachers. Before, we didn't have as much community support, so this program has shed new light on what we're doing here and what we can offer kids. We're a public school with a waiting list in every grade level, which is not that common. Parents are more supportive of what teachers are doing. My eight years here have changed so drastically. It's really been amazing to see this transition.</p> <p>3. It's challenged the way that they teacher. A lot of teachers are traditional in that they want to teach in the same way that they learned, and that makes them feel more comfortable in how they're teaching. So, it's definitely challenged the way that they write their lessons and how they're assessing their students, the way they look at the data, the way that school can be a technologically advanced place for the future graphic designers and future game designers. That's what we feel we're capable of here, and we've got to be sure that what stands out here is the way that we're using the technology effectively to inspire and educate our children. So, we have to keep pushing ourselves so that we don't become stagnant. It's constantly challenging us, or maybe I'm speaking on my own here, but I do look for these innovative ways we can use the technology in order to better instruct our students, engage our students, and move them forward.</p>
<p>5a. How has 1:1 iPad use in the classroom impacted teachers' lesson planning? Lesson implementation?</p>	<p>1. For the teachers who really, truly make that transition, it does make their lesson plans a bit more intense because there are more steps to consider in the lesson plan. They're thinking more systematically, like how am I going to get these resources to the students, how are these resources going to help the students, how are these ideas going to allow students to develop on their own, and those are steps that aren't always discussed but are carefully considered if they want to use the iPad well. It adds a bit more work to the lesson planning itself, but if they take the time, it makes their implementation that much more valuable and effective. The delivery of the lesson is so much</p>

	<p>more natural. So, there's a give and take; they do the work on the front end so that they can reap the rewards on the back.</p> <ol style="list-style-type: none"> 2. It's a lot different. The planning process has really changed. They used to have a lesson plan template to fill out, and we went through it and realized that, given the resources, the plan was so separate from what they were actually doing in the classroom. It wasn't meant for teachers in our school, with our technology. So, now, teachers send us their presentations for their students that they've designed before they actually teach with them. Now, they're spending much more time and thought on what they're putting before their kids each day and what they want the students to be able to do, so there's been a shift there. Filling out the lesson plan was taking up time that they now use to reflect on their work. They're thinking about their role in the classroom. Everything that teachers create, presentations and videos, is shared with the students. This lets their students go back to any and all resources on the iPad, take notes, annotate, and everything. In terms of implementation, they're definitely more interactive in the classroom with students. They're not talking at students, just standing in the front of the room and delivering instruction. It's got them to be more interactive. We see much more engagement, so that's changing how teachers lesson plan and teach. The technology really lends itself to that. 3. I think I've answered that previously. It's just now so easy for them to share their lessons and ideas with each other, and they've got a world of resources available to them now to find and share. We don't want students to be in sit-and-get classrooms. We want them to have opportunities to manipulate the content and show what they know, so that's most important.
Additional comments?	<ol style="list-style-type: none"> 1. No. 2. This has helped us shift from school as we know. Our staff now feels that by any means necessary, they'll work until our kids are successful. I feel like we've been able to grab on to students who were very reluctant, who weren't successful, and we've changed things for them. The same kids who didn't

	<p>want to read now go on their devices and find an eBook to read or practice on an app or website. It's great to give them these opportunities to want to learn, to want to come to school, to want to read. Our technology is helping them love school, and I'm excited about that.</p> <p>3. I feel proud of what we've done. I feel that we are capable of more, a lot more, and I look forward to us going to the next step.</p>
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