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The iPad as an Instructional Tool: An Examination of Teacher Implementation Experiences

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AN EXAMINATION OF TEACHER IMPLEMENTION EXPERIENCES

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
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ABSTRACT

At present, handheld devices and tablet computers are infiltrating public schools across the nation, the most popular model being the Apple iPad. Schools and teachers are attempting to integrate the devices and are using a variety of methods and models for implementation. The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers.A review of related literature was conducted to inform the conceptual framework, design, data collection, analysis, and synthesis components and stages of this study. Qualitative methods, including teacher-participant interviews and classroom observations, were utilized in this study and served to inform the researcher's understanding of the phenomenon. The purposefully selected sample consisted of eight teacher-participants who were engaged in an iPad implementation project in their respective schools in Jobs School District. The data collected underwent several phases of coding and subsequent findings were organized to reflect the research questions and conceptual framework. The research revealed that teachers did not receive adequate support to integrate iPads in their respective content areas. As a result, teachers relied on colleagues and their students for support. The research also revealed that teacher pedagogical behaviors remained unchanged throughout the implementation period. Teachers tended to continue to focus on standardized test preparation and to rely on the same instructional methods that they utilized prior to implementing the devices. In addition, the research indicated that teachers perceived that iPads had the potential to positively impact student engagement and learning. This was based on teachers' perceptions of increases related to student time-on-task and improvements in quality of work. Recommendations are offered for practicing educators, for further research, and for educational policy.

This dissertation is approved for recommendation to the Graduate Council.

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Chapter 1

Introduction

This study seeks to explore the phenomenon of how classroom teachers are approaching the integration of iPad technology in their classrooms. The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. It is anticipated that the knowledge generated from this research will provide new insights into the impact of the device on teacher pedagogical behaviors and student learning experiences to inform integration practices in educational practice. This research employed qualitative methodology to illustrate the phenomenon of study. Participants of this study consisted of classroom teachers involved in an iPad implementation initiative at a rural school district in a south-central state.

This chapter begins with an overview of the context and background that frame the study. The overview is followed by the problem statement, the statement of purpose, and accompanying research questions. This chapter also includes a discussion regarding research approach, the researcher's perspective, and the researcher's assumptions. The chapter concludes with a discussion of the proposed rationale and significance of this research and definitions of the key terminology used throughout the study.

Background and Context

Although there is an abundance of research available on technology integration in the classroom, the majority of it is focused on specific efforts at the local or state levels and its influences, or lack thereof, on student engagement and academic achievement. Additionally, the predominant theme of this volume of literature is dedicated to the implementation of personal

computers, as opposed to more current technological devices that have emerged on the market in recent years.

Although new technology tools are introduced to society almost daily, one gadget, the Apple iPad, has been at the center of media attention since its release in February of 2010. The 2011 release of the iPad 2 and the 2012 release of the iPad 3 prompted even more of a buzz about the device. Not only does the iPad differ physically from other handheld devices, its functionality and applications offer the most interactivity of such tools available to consumers.The iPad features built-in language and accessibility tools, and offers thousands of free and low-cost applications, many of which are educational in purpose, through the Apple iTunes Store. Because of these attributes, the device has attracted the attention of many individuals and groups who are interested in how the product might be used in the field of education. Althoughresearch is extremely limited on the impact the iPad is having on teaching and learning, educators and other stakeholders are convinced that positive implications for differentiating instruction, communication, data collection, and 21st Century skill development abound.

The iPad was the first tablet computer developed by Apple. It is considered unique because of its price, physical size, processor speed, storage capacity, Wi-Fi connectivity, mobility, and accessibility features. The iPad 2 and iPad 3 each feature an even smaller design than the original, a faster processor, two cameras that allow for two-way video and audio communication, and a 10-hour battery life. The device was originally intended to be used for interacting with audiovisual media, including Web-based content, video, music, and electronic books (or e-books). Due to the iPad's popularity, thousands of third-party applications have

been developed that allow users to utilize the device for a number of productivity tasks, in effect allowing it to function as a personal computer.

During the past two years, large and small school districts across the nation have implemented iPad initiatives in a variety of classroom settings with a perceived expectation that the result will be an increase in overall student achievement. Some believe that student engagement with content will improve, which will eventually result in higher motivation to learn. An overall hope is that implementation of the iPad and some of the many available academic apps geared toward math and literacy might somehow lead to improved student performance on standardized tests. Others are skeptical. According to Simpson (2011),some educators are concerned that "the technology itself can become a distraction from learning" (p. 2). Sheargues that students and teachers alike can become sidetrackedby the device's many entertainment features, which could result in less time spent on educational tasks in the classroom. Norris and Soloway (2011) argue that the iPad's influence on student learning is dependent upon the approach teachersused for implementation and the access model that is adopted by each school. According to Norris and Soloway (2011), "a cart of iPads will have about as much impact on student achievement as a cart of laptops had on student achievement" (p. 1). Instead of limited, in-class access to these technologies, they promote ubiquitous models of implementation, through which each student is provided a personal device that is accessible to him or her around the clock.

Norris and Soloway (2011) were also concerned that teachers will continue to teach using traditional methods, methods that have been deemed ineffective in recent years. These researchers are not alone. Quillen (2011) reported that in a pilot iPad initiative in the State of Virginia, teachers simply replaced portions of the student-issued textbook with the same

textbook company's app and required students to "open worksheets off the Blackboard Inc. classroom-management site and complete them with a stylus pen during a classroom exercise" (p. 2). These types of reports indicate that some teachers may still be relying on traditional methods of instruction to integrate new technologies. Valstad (2010), whose research focused on the pedagogical potential of the iPad, concluded that "a more collaborative learning environment together with game-based learning technologies have the potential to enhance student learning, particularly to enhance the development of skills such as self-confidence and motivation, and to allow students to reflect upon what is taught" (p. 81).

A key concentration in this study was the examination of the implementation methods used by individual teachers in their efforts to integrate the devices. Although hundreds of schools are already implementing or are planning to implement iPads, no one seems certain of the outcomes or what processes should be undertaken to ensure that the devices serve their intended purposes. The lack of research available on iPad implementation in schools has left school districts and classroom teachers in a conundrum as they attempt to integrate the devices in effective ways. This research deficit will be diminished by this study.

Problem Statement

Research reveals that a significant number of schools across the nation areintegrating iPad devices in their classrooms using various implementation models to enhance instructional practice. Gaps in the literature related to specific iPad implementation models and the device's use as an instructional tool, are evident. Sufficient time to consider implementation efforts, product updates, and higher rates of adoption of the devices by schools, makes the present time optimal for pursuing research related to this topic. Research is needed to determine how classroom teachers are using the iPad as an instructional tool, how teachers are attempting to

make curricular and disciplinary connections, how their pedagogy is or is not changing as a result, and the types of student interactions that are occurring during iPad-integrated activities. Understanding this phenomenon requires an investigation of the approaches being used by teachers and the experiences that they are providing to their students.

Statement of Purpose and Research Questions

The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. It is anticipated that through the discussions with and observations of teacher-participants in this research study, knowledge will be generated to provide insight into the impact of the device on teacher pedagogical behaviors and student learning experiences to inform integration practices in education. To illuminate the problem, the following research questions were addressed:

1. How is the iPad being used as an instructional tool?
2. How are curricular and disciplinary connections made?
3. What pedagogical shifts, if any, are occurring?
4. What types of student interactions are taking place?

Research Approach

With the approval of the University's Institutional Review Board, the research examined the experiences of classroom teachers as they attempted to implement iPads as instructional tools in their classrooms. The investigation represented a phenomenological qualitative research design. Teacher experiences were explored through one-on-one interviews with each participant charged with implementing the devices and through classroom observations during which times implementation of the devices was occurring.

This study relied primarilyon data gathered using in-depth, semi-structured interviews of participant-teachers. With the assistance of the researcher's methodologist, the researcher developed and piloted an interview protocol that reflected the four research questions that this study addressed. Colleagues in one of the researcher's advanced research classes also critiqued the interview protocol. As a result of these inputs, appropriate revisions were made. Some preliminary themes that emerged during the pilot interviews with elementary teachers were increased student motivation, curriculum implications, and teacher frustrations related to implementation and infrastructure issues in their respective schools.

The second primary method for collecting data was through classroom observations. Observations allowed the researcher to view the phenomenon from an outsider's perspective, to identify patterns in behaviors and emotions, as well as relationships among participants. Observations played a key role in assisting the researcher in understanding the issues and results that manifested during the iPad initiative atJobs School District, as she was able to observe the interactions and dialogue that occurredamong students and between the teacher and his or her students.

The data collected during the interviews and observations formed the basis for the overall findings of this study. Each teacher-participant was identified by a pseudonym and all interviews were digitally recorded and transcribed verbatim. A comprehensive review of related literature was conducted which served to inform the study's conceptual framework and the identification of coding categories. In addition, various strategies were employed to ensure validity and reliability in the coding, analysis, and synthesis processes. Peer reviews at different stages in the research were also conducted.

Assumptions

Based on the researcher's experiences and background as a public school teacher charged with integrating technology in her classes and as a college professor assigned to teach courses intended to prepare pre-service teachers for effective implementation of a variety of technologies in their future classrooms, two basic assumptions were made regarding this study. First, undergraduate coursework does not adequately prepare classroom teachers to integrate new technologies into their curricula or disciplines. Many programs of study require that teacher education candidates take a single course related to technology integration. The focus of this type of course is using technology to assist in "teacher tasks." In other words, pre-service teachers are taught to use applications such as PowerPoint and devices such as SMARTBoards to assist them with content delivery. Limited opportunities to practice planning and delivery of activities that require P-12 students to use technology to achieve academic goals are provided.

Second, practicing teachers may be required to implement new technology initiatives unwillingly and without adequate support for effective integration. This assumption is guided by premise that teachers in the state where Job School District is located are required to complete six hours of technology-related professional development annually. However, much of this training in provided in a large-group setting, is not job-embedded, or content-specific. Additionally, follow-up support may not be accessible to teachers as they attempt integration. The acquisition of technology skills by teachers, then, may be dependent on the availability and quality of support provided in their districts and schools.

The Researcher

At the time that this research study was conducted, the researcher was employed as a faculty member in a school of education where she serves as the coordinator of the Business and

Technology Education program and was assigned to teach courses that focused on pre-service teacher preparation to integrate technology in the classrooms. Additionally, the researcher spent several years teaching technology as a subject in a public school setting, and also conducted numerous workshops and professional development sessions aimed at assisting classroom teachers (including college professors) in integrating various technologies, including hand-held devices, in their curricula. The researcher is also the co-founder of *Schools Without Walls*, an organization that provides in-depth support and training to school districts and teachers on technology integration. Thus, the researcher brings practical experience and professional knowledge to this study, having worked with both students and teachers in technology integration, and most recently in iPad integration in the classroom.

The researcher acknowledged that while her experiences and knowledge on the subject of technology integration in the classroom might inform the study, this orientation also had the potential to bias her judgment regarding the interpretation of the data findings. The researcher, however, was committed to self-reflection, reflexivity, peer and participant validation to ensure validity and reliability. Additionally, the research design called for a triangulation of the data through the use of multiple data collection methods and by obtaining multiple perspectives.

Rationale and Significance

The rationale for this study originated from the researcher's interest in the subject of technology integration in the sphere of education and her desire to explore the strategies that teachers utilize to provide technology-enriched learning experiences to their students. Teacher-participants may be at various points within their professional careers, may exhibit a wide range of pedagogical behaviors, and may have different perspectives regarding the value of technology integration in the classroom.

Increased understanding of how teachers approach technology integration, and specifically iPad integration, in their respective disciplines may serve to guide other teachers or school districts to implement the devices in their own classrooms. This phenomenon could also be better understood regarding its impact on student learning and motivation, as well as teacher perceptions regarding the processes and outcomes related to such initiatives and their own pedagogical behaviors. In effect, the study has the potential to inform instructional practice related to technology integration in the academic curricula, which could benefit educators in general.

Definitions of Key Terminology Used in This Study

App – A software application that can be downloaded and installed on a personal device, such as an iPad, iPod, or iPhone. Apps available for Apple products are available for purchase and download in the iTunes Store.

Instructional Tool- An instrument used to aid a teacher in delivering course-specific content to students. The iPad is classified as an instructional tool.

Pedagogy- Refers to the actions undertaken by a classroom teacher to ensure that learning takes place. Pedagogy can encompass strategies, selecting curriculum and resources, and assessment or evaluation methods.

Phenomenological Research – A qualitative method of data collection, synthesis, and analysis that seeks to describe the first-hand, or lived experiences, of study participants.

Traditional Teaching Methods – Refers to a set of instructional methods in which the teacher is the center of attention, serves as the provider or source of all knowledge, and the director of all learner activities.

Qualitative Research – An approach to inquiry that requires the collection of data in the participants' natural setting, focusing on how and why phenomena occur. Typical collection methods include interviews and observations.

Ubiquitous Computing – A model of technology integration in which a school provides each of its students with a personal device for the duration of a specified time, such as a school year or semester. The device is available to the student around the clock and is integrated into the majority of the students' classes. Ubiquitous computing is also referred to as *one-to-one computing*.

Chapter 2

Literature Review

The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. Specifically, the researcher sought to examine the approaches that teachers are taking in implementing the devices as instructional tools in their respective classrooms, to learn how curricular or disciplinary connections are made in the use of the devices, to determine if and what pedagogical shifts are occurring as a result of iPad integration in the classroom, and to determine what types of learning interactions can be observed among students as they use the devices in their classes. To carry out this study, it was necessary to complete a critical review of the current literature. However, the review was ongoing throughout data collection, analysis, and synthesis to ensure that new research was presented in the final paper.

The literature review explores the experiences being provided to students across the nation who have been or who are currently engaged in iPad implementation initiatives in their classrooms. Additionally, a review of literature related to the history of technology integration in public schools, effective integration, and teacher preparation to support technology integration is also included in this chapter. The areas of focus related to the study's purpose within the critical review are: (a) implementation models, (2) teacher pedagogical behaviors, and (3) curricular or discipline specific connections. A review of the literature on implementation models provides an understanding of the varying structures or phases of implementation that school districts are adopting. A review of teacher pedagogical behaviors provides a context for understanding the knowledge, skills, and attitudes of teachers as they plan instruction and student activities that involve iPads. A review of the curricular or discipline-specific connections being made provide

an understanding of how teachers are using the devices to forward academic or core curricula. These areas of focus were selected because they reflect the conceptual framework and established goals of the study. Additional sections are included to provide historical and contextual frameworks for the study.

Multiple information sources, including books, peer-reviewed professional journals and periodicals, newspapers, and Internet resources were included in the review of literature. These sources were accessed through the University of Arkansas Libraries Databases, specifically ProQuest and ERIC, and the World Wide Web. No delimited timeframe was adhered to in conducting this research. However, research related to the iPad is relatively limited, due to the newness of the device and the limited time that schools have had for implementation in classrooms.

Throughout the review, the researcher attempted to acknowledge gaps within the literature, as well as common themes that emerged. Additionally, differing perspectives on implementation are presented. The introduction provides a historical look at technology integration in public schools and an overview of the iPad's short history and introduction in education. The main areas of research are presented in separate sections and conclude with brief summaries and implications. An alignment of the focal areas of the literature review to the study's conceptual framework is provided in its own section. The chapter concludes with a discussion regarding how the literature has informed the researcher's understanding of this phenomenon.

Introduction

Thomas Edison reportedly once said, "The radio craze will die out in time" (Technology and Change, n.d.). Trends in technology, whether they are educational, business, or

entertainment oriented, have come and gone throughout human history. Some have been embraced, promoted, and celebrated by those considered experts in the field. Still other technological inventions, like the radio, have been criticized and viewed as products of popular culture, destined to be replaced by the next new innovation.

Technology integration in the sphere of education has passed through several phases in the past twenty years. The integration of computer technology began in the early 1980s as personal computers became readily available to the public. Early integration attempts focused on studying the computer as a stand-alone machine and as a device useful in completing productivity tasks. During the 1990s, networked resources became available that allowed researchers and educators to communicate electronically, shifting the focus from the computer as a machine, to the computer as a mechanism for communication. It was not until the late 1990s, however, that widespread Internet access became available and forced a paradigm shift in how the computer and the Internet were integrated in classrooms. During this phase, which continues to the present, technology has been viewed as a primary means of locating, analyzing, creating, and sharing information (Cennamo, Ross, & Ertmer, 2010).

According to Roblyer and Doering (2013), four distinct eras of digital technology integration can be further defined that reflect the types of technology available to schools, as opposed to how they were actually utilized by teachers. The first era, the pre-microcomputer era, spanned a timeframe that extended from the 1950s to the 1970s. Although few public schools could afford the first mainframe multimedia learning station, the IBM 1500, a few universities attempted to introduce these systems in their schools of business. The second era, which focused on the introduction of the microcomputer, reflected several initiatives at the public school level to make these machines available in actual classrooms. The Internet era followed, beginning in

the late 1990s, and brought with it a plethora of third party software applications, the advent of electronic mail, and multimedia resources to extend classroom curriculum. During this stage, some schools began offering distance education programs and "virtual schooling" (Roblyer & Doering, 2013, p. 9). The final era reflects the subject of this research, mobile technologies and ubiquitous access to technology. The era reflects individual dependency on wiring, cables, and devices to support wireless and mobile computing and to facilitate real-time, 24-hour learning.

The latest generation of technological tools to have pervaded our society takes the form of personal hand-held devices and tablet computers. The evolutionary forefather of these devices is most certainly the cellular phone, designed originally as a basic voice-only communication device. However, subsequent revisions and upgrades have resulted in a plethora of personal devices, available in multiple shapes, sizes, and colors, that serve as much more than a medium for verbal correspondence. The newest group of devices is also capable of assisting users with organizational tasks, such as updating and checking personal calendars, sending and receiving emails, text messages, and real simple syndication (RSS) feeds, as well as conducting Internet research, taking pictures, recording video and audio, and interacting with entertainment and educational applications. Considering the number of functions available, the implications for learning and teaching are profound. Many schools across the nation have recognized the value of providing their students with these types of technology tools and have purchased classroom sets of the devices, initiating various implementation models to enhance classroom practice.

Although competing models of handheld and tablet devices are available, the Apple iPad is the most popular device currently on the market due to its unique design, accessibility features, and the abundance of available apps that, if implemented properly, could potentially impact educational practices. Apple's iPhone and iPod Touch were already received, integrated, and

accepted into the educational sphere before the release of the iPad in the spring of 2010. Numerous schools are using iPod technology to support independent student learning through teacher-developed podcasts (teacher-created, downloadable audio recordings) and vodcasts (video recordings). Elementary teachers are using them as classroom centers where downloaded literacy and mathematics applications can be used by individuals or small groups of students to extend learning and remediate. Some districts with large numbers of English Language Learners (ELLs) have found success with using iPods to teach language acquisition (Patten and Craig (2007). After reviewing studies conductedin four schools utilizing iPods to assist English language learners, Patten and Craig reported that:

> Considering the large number of immigrant students entering public schools, one cannot overlook the potential value of the iPod in assisting students who are entering a new school environment, learning English as a second language, and becoming familiar with a new cultural environment (p. 40).

Also unique to these types of devices is that, unlike bulky computers and laptops, these devices make learning portable, mobile, and accessible.

Apple Corporation's successes with the iPhone and the iPod led to the development of the first tablet personal computer, the iPad. The first version of the iPad was released in April 2010 amid plenty of media attention, reviews, and general hype. The publicity and excitement, referred to by some as "iFad" and the "Pad Wagon" reflect how much society has come to value handheld devices and our eagerness to purchase the newest technological tool in an attempt to stay fashionable and appear current. While many anticipated the new features promised by the iPad's developers, others assumed that the device was just a new kind of notebook computer. Upon release, however, many consumers were impressed by the tablet's unique design and

multitude of applications. The iPad was also distinctive because of its price, physical size, processor speed, storage capacity, Wi Fi connectivity, mobility, and accessibility features. Described by Apple CEO, Steve Jobs (2010), as "magical and revolutionary," before its actual release, the iPad has since been lauded by non-technical users from all professional backgrounds as a different kind of handheld. David Pogue (2010), a technical critic for *The New York Times* provided an outsider's review of the product and stated that "in 10 years of reviewing tech products for *The New York Times*, I've never seen a product as polarizing as Apple's iPad" (p. 1). As such, one need not wonder why users continue to exclaim about it and educators seem especially excited by its features.

Apple released the second version of the iPad in February 2011, which added several new features including two cameras that allowed for two-way video and audio communication using its new application (app), *Facetime*, as well as other applications that were already on the market. The updated model also featured an even smaller design (7.31 by 9.5 by .34 inches, 1.33 pounds), faster processor, and a 10-hour battery life. The most recent version, released in March 2012, featured a new Retina high definition display, improved camera resolution (5 megapixels), and an even faster processor. Apple has maintained consistent pricing across models, with the basic iPad price starting at $499.00.

The device was originally intended to be used for interacting with audiovisual media, including Web-based content, video, music, and electronic books (or e-books). Due to the device's popularity, third-party applications have been developed that allow users to utilize the device for a number of productivity tasks, in effect allowing the iPad to function as a personal computer. Apple also provides hybrid cloud (iCloud) storage for many apps available in its iTunes store. Thousands of applications have been developed that allow for word processing,

database and presentation development, as well as spreadsheet entry. Designed to be durable enough for the roughest of users, even children, the iPad is constructed of the same glass and metal used in airplanes. In addition, the operating system (iOS) and application software have yet to be penetrable by viruses or worms. Because of these design features and others, the iPad is currently the preferred choice for non-technical and young users. The ease of use, coupled with the affordable cost, has encouraged educators to purchase the devices in bulk for implementation in their classrooms across the nation.

A key reason why the iPad has become so popular is because of the apps that are available at very low costs, or free in many cases, from third-party providers. Presently, there are over 140,000 iPad apps and 250,000 iPhone apps available for download to the iPad, many of which were designed for educational purposes. Such apps include *iBooks*, which allows users to download interactive electronic books (e-books) for all reading levels. This application allows users to get assistance with the pronunciation of difficult words, enlarge the font to a size that is most comfortable to the reader, and interact with animated graphics. Reader engagement is very high and more and more publishing companies are releasing e-book versions of their texts for *iBooks*. Some textbook companies, fearful of losing profits, have yet to provide their books in a digital format, but others such as Houghton Mifflin Harcourt, had pilot textbooks available for implementation during the 2011-12 school year (*Wireless News*, 2010,pg. 1).

Although textbook availability may be an important factor for some schools considering iPad initiatives, educators should be aware that the plethora of educational apps and Web-based content currently available may diminish the need for the adoption of textbooks at all. There are apps for practically every discipline and topic. For example, literacy teachers are already using *iBooks* to teach reading and vocabulary development. Chemistry teachers are able to teach the

periodic table in a manner that engages all types of learners through an application called *The Elements*. This app allows users to touch, study, and rotate each of the 118 elements, which can be viewed in 3-D, if a pair of 3-D glasses is available. Preschool and kindergarten students can learn to identify letters of the alphabet, numbers, shapes, objects, and colors using free applications such as *Alphabet Fun*, which allows little fingers to trace letters and count animals within a game interface. There are hundreds of educational apps, many free, available to teach almost any concept or address any gaps in content that are traditionally filled by textbooks.

School district goals, as well as models, for implementation vary. Some districts have implemented models with a perceived expectation that the result will be increases in overall student achievement. Others believe that student engagement with disciplinary content will improve, which will eventually result in higher motivation to learn. An overall goal is that implementation of the iPad and some of the many available academic apps geared toward math and literacy might somehow lead to improved student engagement to learn and increased performance on standardized tests (Kelleher, 2011; Marcoux, 2011). Critics, though, contend that technology usage in schools does not always meet the expectations of educators and other proponents of its integration (Murray & Olcese, 2011). The extent of implementation across grades and disciplines also varies, due in part to differences in technology and infrastructure budgets. As a result, the experiences being provided to students involved in these initiatives also vary across classrooms.

Models of Effective Technology Integration

A consistent or universal definition for “true” or “effective” technology integration does not exist, as how effectiveness is measured varies depending upon the goals of the school and/or classroom teacher. One definition of effective technology integration states that it “should

prepare staff and students for a 21st century world of work and education" (Johnson, 2009). Other research, however, seems to directly associate effective instruction with increases in student learning as evidenced on standardized tests (Dennis, 2009; Moss, 2005). The push for accountability does not necessarily complement the push for integration of technology and 21st Century skill development also deemed necessary for future success in our students, as the delivery methods used to achieve these two goals contrasts in most classrooms. Constructivist instructional practices are frequently "crowded out of the curriculum by practices designed to prepare students to score well on state assessments" (Brooks & Brooks, 2013, p. 223). As a result, many teachers struggle to balance curricula and present holistic learning experiences that prepare students for a broad spectrum of skill development.

What some educators fail to realize is that technology integration can actually lead to increased academic achievement and knowledge acquisition for all types of learners, especially when technologies are implemented with the goal that they will be used as tools to advance existing curricular objectives. According to the Superintendent of Arizona's Scottsdale Unified School District, their schools were not successful until they realized that "technology achievement was really about improving their students' performance in math, science, reading, and the core subject areas" (Boyle, 2005, p. 2). Their approach, which is considered effective by the superintendent, ensures that students are equipped with both hardware and software instruction that are directly connected to the content, concepts, and skills that are relevant to specific courses or disciplines. A foundation of technology support and learning experiences is provided to all students and teachers to ensure that each group is comfortable performing the tasks they are charged with before they are actually asked to perform them.

In contrast, a qualitative study conducted in two high schools in California found that some schools and teachers with high access to cutting-edge technologies infrequently used the equipment to enhance the existing curriculum because of their perceptions that computers may not be appropriate for all student projects or lessons or because the teachers felt that the integration of technology did not comfortably fit into their existing pedagogical approaches (Cuban, Kirkpartrick, & Peck, 2001). However, when students in these schools were assigned to teachers who did attempt to integrate technology into the curriculum, evidence showed that these students perceived themselves to be better learners and the computer literacy that they gleaned from their experiences was transferred to other subject areas. A similar study found that classroom technology had a positive impact on student behaviors related to preparedness for class, attentiveness, work quality, student participation, and overall student learning (Lavin, Korte, & Davis, 2011). These researchers also reported higher student perceptions of teachers who integrated technology. To most educators, behaviors such as these *do* illustrate effective teaching strategies because they indicate increases in student motivation to learn and academic achievement. However, in order for technology integration to take place, effective or otherwise, teachers must first be supported in its implementation in their classrooms. The section that follows discusses various school efforts to train teachers to use technology in their classrooms.

Teacher Support for Technology Integration

Although the definition of “true” or “effective” integration of technology remains fluid if not disputed, many educators agree that a key factor of influence in any classroom is the teacher and his or her ability to plan learning opportunities that meet the diverse needs of all types of learners. Without adequate support and training for technology integration, some teachers may be reluctant to use technology in their classes and rely more on traditional methods of content

delivery. According to Cennamo, Ross, and Ertmer (2010), teachers must undergo a series of developmental stages of technology integration as they move from novice user to teacher-facilitator of student use. When the 2008 National Educational Technology Standards (NETS) for teachers were released, they included a continuum of four phases of teacher behaviors intended to provide performance criteria for teachers and teacher education students. The stages of the continuum are: (a) the beginning level, which includes new teachers or teacher education students who are first learning to use technology in their instruction, (2) the developing level, which describes emerging efficient and effective teacher behaviors, (3) the proficient level, which indicates that efficient and effective teacher behaviors are present, and (4) the transformative level in which teachers exhibit behaviors that "involve exploring, adapting, and applying technology in ways that fundamentally change teaching and learning and address the needs of an increasingly global and digital society" (International Society for Technology in Education, 2008, p. 10). Unfortunately, available research reflects that many teachers are attempting to use available technologies in ways that fall along the lower stages of the continuum.

Further, Prensky (as cited by Smaldino, Lowther, & Russell, 2012), has developed a continuum that describes teachers in the "variable process of technology adopting and adaption" (p. 12). The four-phase process includes: (a) the "dappling" phase in which teachers begin to randomly add technology components or assignments to their existing lessons, (b) the "old things, old ways" stage in which teachers use available technology to teach in the same manner (i.e. typing up lecture notes using multimedia software instead of posting them to a chalkboard), (c) the "old things, new ways" phase that requires students to perform typical tasks, such as taking notes using a keyboard, using available technology, and (d) the "doing new things in new

ways" stage in which technology is used by teachers and students to extend "environments beyond classroom walls" by connecting students without outside resources (Smaldino, et al., 2012, p. 12). In effect, these phases can also be aligned to the method of content delivery. For example, teachers at phase 1 are typically teaching in a traditional classroom; whereas, teachers at phase 4 may be delivering instruction in a hybrid or online classroom setting.

According to Allred (2013), "the most effective teachers realize that the world and students have changed since they completed their undergraduate work, and they look for opportunities to address the gaps in their knowledge and ability" (p. 11). Until such gaps are addressed, some teachers will continue to exhibit behaviors associated with those found at the lowest stage of ISTE's teacher technology continuum. Additionally, teachers who have little access to professional growth opportunities or who do not take advantage of them may be placed at a career disadvantage in coming years as more options are provided to students regarding how and where they learn. Bonk's (2013) research, which focuses on the importance of and expectation for continuity in learning, describes many trends that are already common in some parts of the world related to access to learning. According to this author, more students are being provided opportunities to select their own online teachers based on their interests and/or geographic location and the result is that "the notion of a teacher will shift from a deliverer of content to that of a concierge who finds and suggests education resources" (Bonk, 2013, p.184), in effect providing a personalized learning experience for students through use of technology. Teachers who are not able or willing to learn technologies related to online course delivery may find fewer employment opportunities as expectations for such services increases and student options for enrollment become more prevalent.

Unfortunately, opportunities to strengthen their own content knowledge and skills may not always be readily accessible to teachers, as many classes and trainings are offered when teachers are working. Therefore, the burden and responsibility of training and supporting teachers in new initiatives, including those related to technology integration, has fallen on school districts. As the goals and agendas of individual schools differ and tend to reflect the needs of the teachers and students associated with them, districts have found it most feasible to design and offer their own professional development. Although the models for delivering such support differs from district to district, some educational researchers assert that quality professional training is job-embedded, relevant to curricular goals, ongoing, and evaluated to ensure implementation (Penuel, et. al., 2007).

Research by Gayton and McEwen (2010), examined 20 studies related to how professional development was commonly evaluated and devised a model for achieving effective professional development in technology. Their model described five levels of planning that are needed for successful teacher training: (1) professional development must be logistically planned, (2) what instructors need to know and be able to do must be identified before student learning outcomes can be established, (3) internal support is needed for effective integration, (4) changes to instructional practices must be identified and made measurable, and (5) student learning outcomes related to technology must be identified. Similar research revealed that teachers who received "school-level supports in combination with a wide array of curricular and assessment resources and logistically more convenient technology access, expressed increasingly stronger ideological affiliations across time with technology integration and learner-centered instruction" (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010, p. 24). This indicates that each step within the planning process should also take into consideration the curricular goals for

student learning, as well as those related to technology skill development in teachers and students.

Although professional development focused on technology integration does not always appear to consider curricular goals, schools have still made attempts to support teacher efforts to incorporate the use to technology in their classes following a variety of training models. The most common forms of training and support consist of workshop attendance, in-house or site-based, and self-directed professional development sessions (Morwick, 2011). In each case, professional development typically consists of isolated workshops aimed at introducing a teacher to a topic or skill, and involve very little follow-up or accountability for implementation. Instead, Darling-Hammond and McClauglin (1995) believe that more effective models provide teachers with opportunities to show or share what they have learned with colleagues or peers, as well as apply new concepts and strategies within their own disciplines and unique contexts. Adoption of more reflective professional development models have become more common in recent years and have resulted in both teacher and student growth related to technology.

Some schools have found success in supporting teacher technology integration through the organization and facilitation of professional learning communities. Professional learning communities (PLCs) have become more popular in recent years and serve as opportunities for teachers to extend their own learning in a specific and focused area related to their curriculum or education in general. Not only do they provide opportunities to learn new content, but to also apply it and collaborate in implementing new initiatives with their colleagues. Some teachers who participated in PLCs for extended periods of time reported gains in student achievement that they attribute to improved instructional practices learned through participation in the PLCs (Corbitt, Smith, & Wilson, 2009). Additionally, Cifuentes and Maxwell (2011), who examined

technology support in three rural school districts, found that after two years of participation in professional learning communities intended to support technology integration, teachers saw results in three areas: (1) a campus-wide increase in technology integration in instruction, (2) an increase in student engagement with content, and (3) a pedagogical shift from teacher-centered to student-centered instruction. Although PLCs require teams to schedule time to meet periodically, frequently outside of the school day, they can be effective avenues for assisting teachers in honing their technology skills.

Related to the PLC model of professional development, some schools have found success with train-the-trainer models of technology support for classroom teachers. In this model, small groups of teachers are sent to intense workshops targeted at improving specific skills and learning to teach these skills once mastered. The teachers return to their respective schools as trainers or coaches and support their colleagues in implementing the same skills. Pancucci (2007) found that teachers who participated in this model perceived it to be an effective tool for staff development and led to higher comfort levels of teachers as they attempted to implement new technologies. Other schools have found success in developing an alliance of support structured by grade level and content area, in which designated specialty coaches provide "just in time professional development" by meeting with individual teachers in their classrooms or in affiliated groups to provide immediate support (Bryk, Harding, & Greenberg, 2012, p. 96).

Despite professional development opportunities such as these, some teachers, especially those who are considered veteran educators, may still struggle to integrate technology. Plair (2008), states that the current model that utilizes such formats as how-to workshops and seminars fails to build the "confidence and efficacy leading to technology fluency" (p. 70) that is needed for effective implementation. Instead, she advocates for the designation of specific individuals

within the schools who can serve as constant integration support specialists to teachers as they continue to grow in their abilities to use technology. Although many schools have technology support personnel on staff, these individuals are typically charged with working on technology issues related to purchasing, installation, and repairs. Few schools have support personnel, aside from library media specialists, who are charged with supporting teachers in their endeavors to integrate technology in their classrooms.

Of course, school districts should not be held solely responsible for training and supporting teachers who are new to the profession in areas related to technology integration. According to Pope and Golub (2000), this training should be integrated throughout teacher pre-service experiences and modeled by their college instructors. Although research indicates that all teacher preparation programs in the United States do integrate technology somewhere within coursework and/or field experiences, the vast majority of technology training is delivered in the form of a stand-alone technology course designed to prepare all levels and disciplines of future educators (Gronsethet al., 2010). The result is that many new teachers are unprepared to fully integrate a variety of technologies during their field experiences and later in their own classrooms because they have been denied opportunities to practice planning and implementing technology-infused lessons.

One case study conducted in a large urban middle school showed that pre-service teachers benefited significantly when they were assigned to cooperating teachers who frequently integrated technology in their own classrooms (Grove, Odell, & Stradler, 2006). These student teachers were provided opportunities to practice what they were learning with the support of their cooperating teachers, who served as teacher-trainers. This research provides evidence that field experiences in which pre-service teachers are required to use technology in their teaching

can provide opportunities for practical applications of the technology tools that were studied in technology coursework taken as part of teacher education programs.

A similar study conducted by the University of Alabama found that pre-service teachers enrolled in their teacher preparation program reported successful technology integration attempts when they were assigned university content faculty with whom to attend technology workshops and who then served as technology mentors in the field (Wright, 2010). The pre-service teachers perceived these opportunities to be non-threatening and supportive, as all parties had attending training together. Although technology preparation for teacher education candidates is certainly still lagging behind what is expected or needed of new teachers, technology itself continues to change at such a rate that it is difficult for many colleges to keep up with current trends and upgrades in software and hardware.

There are arguments that no matter which format of professional development or other training that pre-service or in-service teachers participate, the most valuable technology approaches are taught within disciplinary contexts. According Harris and Koehler (2009):

> "Technology integration approaches that do not reflect disciplinary knowledge differences, the corresponding processes for developing such knowledge, and the critical role of context ultimately are of limited utility and significance, as they ignore the full complexity of the dynamic realities of teaching effectively with technology (p. 395)."

Likewise, research conducted by Martin and Strother (2010) found that when teachers were provided technology professional development, strong correlations were found between professional development fidelity (professional development related to content) and student achievement, as well as lesson plan quality and classroom activities. Unfortunately, most professional development remains focused on hardware and software instead of providing

resources for applying the technology for curriculum-based usage (Harris & Hofer, 2011). Experienced teachers have found that some pedagogical instructional approaches work better within specific disciplines and the same holds true for technology. The tool must fit the task if integration is to be effective in fostering student learning and increases in higher-order thinking.

Pad Implementation Models

A review of the literature on implementation models provides an understanding of the varying structures or phases of implementation that school districts are adopting. Although, the cost of a single iPad – the basic model is advertised at $499.00 – is more affordable than many personal computer models and competing tablets, the device may exceed the budgets of schools serving students from lower socioeconomic backgrounds, especially when you consider the wireless networking infrastructure and additional bulk-purchasing of apps that are required to ensure full functionality (Waters, 2010). Traditionally, poorer school districts have lagged behind in implementing cutting-edge technologies, and to date the research reveals that wealthier schools have been the first to implement iPads in their classrooms (Newman, 2010). This poses concerns as the nation struggles to ensure global competitiveness and equip all students with the 21st Century skills that are projected to be necessary for success. Regardless, districts of varying sizes have purchased iPads and are experimenting with implementation models which include one-to-one initiatives that curb costs by replacing textbooks with the new devices, and classroom carts of iPads purchased for in-class use in specific disciplines. For districts in the thirty-four states and District of Columbia who have experienced cuts to education, mobile devices offer a lower cost ratio per student than personal computer options for integration (Hill, 2011).

When the iPad was first released, large school districts led the way in purchasing the devices in bulk for classroom implementation. A quick Internet search for news related to the

iPad paired with the key words *education*, *schools*, or *classroom*revealed several articles describing iPad implementation initiatives in large school districts across the nation. According to Kevin Simpson (2011), Manitou School District in Colorado, ordered 600 second-generation iPad 2s "with the rationale that they're cheaper than laptops and far more versatile, with potential cost savings down the road" (p. 2). The district planned to save money by replacing traditional textbooks with the $500-$750 devices, considered affordable when compared to many competing tablet models. A *New York Times* article reported that in 2010, "New York City public schools have ordered more than 2,000 iPads, for $1.3 million" [and] "more than 200 Chicago public schools applied for 23 district-financed iPad grants totaling $450,000" (Hu, 2011,p. 1). These districts distributed the iPads to students in one-to-one initiatives, in which the students were actually issued the devices for an entire school year and allowed to take them home.

Smaller districts, like one in Auburn, Maine that purchased 285 iPad 2s for the 2012 school year's kindergarten students, have purchased sets of iPads to be used in classrooms and by multiple users. The Auburn district purchased the devices because, like the larger districts, they hope that implementation of the devices in their classrooms will increase student learning and improve overall achievement (Davis, 2011,p. 1). Several school districts in Virginia also purchased small sets of iPad carts to replace textbooks in specific classes (iPads take off in Arlington, 2011; Students in four schools trade in textbooks for iPads, 2010). Other small districts have purchased small classroom sets with the intention that they will be used for classroom group-work (Foote, 2010; Waters, 2010). Norris and Soloway (2011) voice concerns about this model of implementation arguing that, "carts of laptops haven't raised student achievement, and neither will carts of iPads" (p. 1). Instead, they promote ubiquitous models of

implementation, through which each student is provided with a personal device that is accessible to him or her around the clock.

Although both large- and small-scale implementation efforts are currently occurring in schools of various sizes from California to Florida, little research beyond that related to purchasing numbers and rationales for technology expenditures is available. Instead, only anecdotal research that fails to explore implementation specifics, outcomes, and successes and failures is available on this phenomenon.

Teacher Pedagogical Behaviors

For the purpose of this study, pedagogy is defined as the actions undertaken by a classroom teacher to ensure that learning takes place. Pedagogy can encompass strategies, selecting curriculum and resources, and assessment or evaluation methods. Teachers exhibit a wide range of pedagogical behaviors in regards to how they plan and design their curricular, as well as deliver instruction. In recent years, a pedagogical shift has occurred in which teachers are relying less on teacher-centered models of instruction and integrating more student-centered learning activities that reflect popular constructivist theories of learning. Technology-infused lessons can foster high-level learning as they can support learners as they construct their own knowledge, serve as vehicles for exploration of new knowledge, support learning-by-doing and kinesthetic models, provide opportunities for collaboration and social interaction, as well as avenues for personal reflection on learning (Jonassen, Peck, & Wilson, 1999).

Effective teachers seek to design instruction that will yield, not only high levels of learning in their students, but also activities that will engage and motivate their students to excel beyond basic expectations. Furthermore, most teachers are typically acceptant of new technology initiates in their schools because they afford opportunities for differentiated

instruction, collaboration within peer groups, analytic thinking, and multi-sensory learning experiences (Pitler, et al., 2007). Constructivist approaches that underlie technology-embedded activities and lead to these types of student learning opportunities are only possible when teachers are willing to adopt a non-traditional pedagogical approach through which the teacher serves as a facilitator of student learning, as opposed to a disseminator of knowledge.

Teachers must undergo a series of developmental stages of technology integration as they move from novice user to teacher-facilitator of student use (Cennamo, Ross, & Ertmer, 2010). When the 2008 NETS for teachers were released, they included a continuum of four phases of teacher behaviors intended to provide performance criteria for teachers and teacher education students. The stages of the continuum are: (a) the beginning level, which includes new teachers or teacher education students who are first learning to use technology in their instruction, (2) the developing level, which describes emerging efficient and effective teacher behaviors, (3) the proficient level, which indicates that efficient and effective teacher behaviors are present, and (4) the transformative level in which teachers exhibit behaviors that "involve exploring, adapting, and applying technology in ways that fundamentally change teaching and learning and address the needs of an increasingly global and digital society (ISTE, 2008). Unfortunately, available research reflects that teachers are attempting to use iPads in ways that fall along the lower stages of the continuum. However, the research does not include data or information related to teacher years of experience or education level.

The key to garnering the iPad's educational benefits may be in examining how instruction is designed by teachers, their levels of proficiency in using technology, and the pedagogical behavioral shifts that take place during implementation initiatives. Some educators perceive that the iPad was designed primarily for entertainment purpose and when integrated into

instruction, can actually distract from learning (Simpson, 2011). The result could be less time on academic tasks during valuable instruction time. Norris and Soloway (2011) are concerned that teachers will continue to rely on traditional instructional models that have been deemed ineffective by many educational experts. Teachers piloting an iPad initiative in the State of Virginia reported that some schools had replaced portions of the student-issued textbook with the same textbook company's app (Quillen, 2011). Quillen found that teachers were using the iPads to "personalize reading assignments based on proficiency" [or requiring their students to] "open worksheets off the Blackboard Inc. classroom-management site and complete them with a stylus pen during a classroom exercise" (p. 2). A personal evaluation of the device's implementation in one teacher's classroom reflected the same types of student experiences, "tests, quizzes, and worksheets" (WiredEducator.com, 2010, p. 1). These types of reports indicate that many teachers are still relying on traditional pedagogical strategies when attempting to integrate the devices.

Research is unavailable at this time that describes integration strategies in which teachers use the devices in innovative ways. However, a few blog sites and school district Websites mention strategies that teachers could utilize that have the potential to facilitate higher-order thinking and constructivist models of learning. Teacher responses to a forum that asked them to provide examples of how their schools were "successfully integrating iPads into the school's curriculum" included several cases of teacher attempts to design student-centered learning activities that followed a constructivist model (Secades, 2011). One teacher posted a link in the forum to her school's blog, which shared teacher examples of integration strategies. Included in the blog were teacher-developed and taught lessons that required students to use digital photography to convey their understanding of concepts, to collaboratively collect statistical data

utilizing *GoogleForms* (a free Web-based form builder), and to create weather reports, podcasts, and multimedia stories to demonstrate learning both visually and verbally (iPads at Burley, 2011). Another school district Website included a blog that featured lessons in which teachers asked students to create advertisements for healthy living using the *Phosters* app (iPads in the Classroom, 2011).

Aside from examples such as these, little evidence is available that supports the theory that teachers are using iPads in innovative ways that reflect constructivist theories of learning. A study that tested the majority of educational apps found that although teachers might perceive the iPads to be mediums for constructivist-style learning, the educational apps used in classrooms do not align with current learning theories (Murray & Olcese, 2011). Although more apps are being developed that facilitate creativity, many apps focus on content, facilitating only minimal levels of collaboration or critical thinking on the part of the learner. Valstad and Rydland (2010), whose research focused on the pedagogical potential of the iPad, concluded that "a more collaborative learning environment together with game-based learning technologies have the potential to enhance student learning, particularly enhance the development of skills as self-confidence and motivation, and to allow students to reflect upon what is taught" (p. 81).

Although a true pedagogical shift may not be occurring in teachers implementing iPads, many teachers do acknowledge that they consider the device and its technology as a "book in their pedagogical library as it supports the curriculum but does not drive it" (Baum & Walter, 2011, p. 6). Like the textbook and the personal computer, the iPad is being used to access information and content. However, the device makes learning portable and mobile, which does allow for exploration beyond the confines of classroom walls. The potential of the iPad as an instrument for facilitation of constructivist models for learning exists, but research to date

reflects that teachers may not be utilizing the device to its full potential and that implementation results remain mixed, at best (Kinash, 2011).

Curricular or Discipline-specific Connections

In 1998, the International Society for Technology in Education (ISTE) released the first set of technology standards for students and two years later, released a set of similar standards for classroom teachers. These standards, the National Educational Technology Standards (NETS), define what these specific groups should understand and be able to apply in terms of technology (Lever-Duffy & McDonald, 2011). While the NETS for students focus on specific performances, the NETS for teachers emphasize effective facilitation and design of digital age learning experiences, as well as modeling of technology skills and behaviors. It is important to note that both sets of standards seek to define what true integration should look like in practice and that attention is focused on relevant activities that advance the regular curriculum.

Existing literature does not provide examples of iPad initiatives that focused primarily on learning to use the device for the sake of learning about new technology. Instead, most initiatives focused on the experiences of teachers and students in using the iPads to forward pre-established curricular or discipline-specific goals. Classrooms that once incorporated computer technology and software specific products in their curricular projects are now designing smaller-scale activities that utilize design and creation apps (Baum & Walter, 2011). For the most part, however, the design of these projects and activities is quite similar to those used in traditional classrooms where iPads or other mobile technologies are unavailable. The research indicates that teachers who are integrating the devices across disciplines are doing so primarily to increase student knowledge in identified content-specific areas.

The implications for iPad use in language arts classrooms are numerous because of the plethora of productivity, reading, and writing apps that are available for installation on the device. As mentioned earlier, many districts are justifying the purchase of the devices by replacing costly textbooks. Not all textbooks have made comparable apps available, but with some creativity and research on the part of the teacher, content available in textbooks can be located on the Internet and made available to students. Additionally, a default app on the device, *iBooks*, allows users to access books in the public domain, as well as to download books that are applicable to the content being studied. Apple released a new software application in 2011 that allows anyone to author their own *iBook* using *iBooks Author*, available in the MacAppStore. In effect, anyone with the application can author and publish his or her own textbook using the application. Other third party apps can provide supplemental information on specific topics at little or no charge. Of course, the Internet provides access to additional supplemental content and resources.

Educators in this discipline may be interested in research that examines the impact of the iPad on the reading habits of students who are issued the devices for this purpose. Although research on the iPad specifically is not available, one study did explore the reading experiences of young children who were asked to read using other portable e-reader devices. The study concluded that reluctant readers were more motivated to read, but this was attributed to student interest in the device and not necessarily the reading material available through the technology (Maynard, 2010). As e-readers in general become more popular, the research in this area is sure to expand to reflect the influence that such devices have on student behaviors and academic achievement.

Not only are students reading more using the devices, some teachers report that students are actually turning in longer essays because they are motivated by the device's ease of use when undergoing tasks related to writing and editing documents (Boran, 2011). Students are also writing in non-traditional ways, taking notes using the devices, sharing their reflections on specific topics, and posting their written work to blog sites (Keller, 2010). Other language arts classrooms are integrating apps such as *Popplet Lite* and *Brainstorming*, which allow students to organize their ideas in the pre-writing stage, as well as apps such as *Evernote*, *Flipboard*, and *Delicious*, which were designed to facilitate the collection of pages, graphics, and *Weblinks* related to student research topics (Foote, 2010). The iPad's design, which incorporates a built in keyboard, as well as voice dictation capabilities, facilitates its use within the language arts curriculum.

Few examples of iPad integration in social studies were available, although content can be found that proposes best practices for integration in this field and discussions regarding the device's potential in the classroom. One case study examined student performance on a specific project in which one group was issued iPads to use for conducting research with primary documents and completing an accompanying graphic organizer and a second group addressed the assignment using traditional, paper-based methods that did not incorporate any form of technology. The results indicated that students who used the iPads performed better overall than the students who did not (Garcia, 2011). Anecdotal research indicates that some teachers are using the devices to access free newspaper apps to study current events (Ross, 2012). Holistically, it appears that within the social studies discipline, the devices are primarily being used as an avenue for accessing supplemental resources.

iPads are also being incorporated in science classrooms, which have traditionally provided hands-on learning experiences for students through the integration of laboratory activities designed to foster exploration. Students enrolled in biology courses are able to perform dissections without actually conducting them on living creatures by using apps such as *Frog Dissection* and *Rat Dissection*. Several schools are using a chemistry app called, *The Elements*, to teach about the periodic table. This app also features video recordings of science experiments that involve different elements (Barack, 2010). Some teachers are making interdisciplinary connections by requiring students in their science classes to write about science. For example, younger students at a school in New York are using a $2.99 app to create books on experiments conducted on earthworms (Baum & Walter, 2011). The graphics for interactive apps such as these make the virtual experiments and experiences as close to laboratory reality as possible for students who might otherwise be reluctant to participate or who might lack access to such activities.

Within the discipline of mathematics, integration of the iPad appears to be mimicking traditional strategies for assisting students in mastering the content. The State of Virginia launched a series of mathematical test preparation apps that focus on the math curriculum for grades three through eight in September of 2011 (*Wireless News*, 2011). Virginia is the first state to attempt to use the devices to enhance student performance on standardizes tests. Houghton Mifflin Harcourt released the first sets of textbooks designed as iPad apps (Hu, 2011). The apps include video tutorials and other multimedia features that allow for more interaction than can be achieved with a printed book. Specific examples of teacher integration were not found.

The iPad is also being integrated into elective classes, as well as classes that serve students with special needs. Some examples include the use of interactive media (i.e. videos of student performances and music files) downloaded to the iPad for use in dance classes and *Sketchbook Pro* and *Doodle Buddy* apps being used as drawing tools in an art class in New York (Tomczak, 2011; Baum & Walter, 2011). In both examples of integration in elective courses, the devices are being used in traditional ways, as less technical, analog options are available to perform the same tasks. Such is also the case in classes where students with special needs are served. Research has shown that technology may be effective with at-risk students, as well as those with special needs (Pitler, et al., 2007). Attempts have been made to use iPads to assist English Language Learners (ELL) with second language acquisition, as well as translation apps to aid the students in communication with their peers and teachers (Demski, 2011). ELL teachers involved in the initiative report that students depend on the *Dictionary* app for both written and oral communication, the *Kindle e-Reader* app to improve their reading skills, *Voice Memo* to record themselves speaking and self-assess fluency, completing written assignments using *Pages* and *Keynote* apps (Demski, 2011). One study also showed improved comprehension of students with autism who were provided interactive e-books instead of traditional printed book text (Price, 2011). A special-needs school in New Jersey has also reported improvements for students in the areas of fine-motor skill and social skill development (Boyd, 2011).

Across disciplines and in diverse settings, educators contend that the iPad, if implemented effectively, has the potential to foster independent inquiry and research, as well as collaborative thought and communication skills (Newman, 2010). Anecdotal research offers first-hand accounts of teacher attempts to integrate the devices. However, few examples within

the specific disciplines indicate that teachers are using the devices to the potential that the media, as well as numerous educators, have expressed regarding its implications to achieving curricular goals. Gaps in the literature are related to specific models of integration. These gaps include research examining teacher-created lesson plans, the impact of the devices on student learning and motivation, and teacher attempts to change pedagogical behaviors to effectively integrate the devices through differentiated instruction or collaborative learning opportunities.

Conceptual Framework

The review of literature related to this phenomenon has contributed to the draft of a conceptual framework for the design and administration of this study (See Figure 1, Conceptual Framework). The conceptual framework design informed and guided the research process and has served to inform the methodological design and the development of the data-collection instruments to be used in the field. The conceptual framework also served as a key for understanding how data were collected and coded, and the findings and interpretations were aligned to reflect the conceptual framework.

It is important to mention that although the conceptual framework served as a guide throughout the process, a few differences or new ideas evolved that were not noted in the conceptual framework. Within the category "implementation approaches," only full classroom sets were used by participants. However, the approach varied in that some teachers had full time access to dedicated carts, but other participants shared carts with other teachers in their school building. Additionally, within the category "curricular or disciplinary approaches," only three subject areas were explored: math, science, and language arts. Teachers from other disciplines did not volunteer to participate in the study for unknown reasons. Finally, a new category emerged that could not be overlooked. Teachers discussed at length their perceptions regarding

the impact the device had on student engagement and learning. Thus, this area was included as a finding in chapter 4, but was not included in the study's conceptual framework. Throughout the study, however, the conceptual framework served to organize the research, its analysis, and the researcher's interpretations of the phenomenon.

Each of the categories in the conceptual framework reflect the four research questions as outlined in chapter 1 and revisited again at the beginning of this chapter. The first research question examined the approaches that teachers are taking in implementing the devices as instructional tools in their respective classrooms. Therefore, the conceptual category that was used to capture responses to this question was "Implementation Approaches." The second research question examines the curricular or disciplinary connections that were made in the use of the devices. The category title for this question was "Curricular or Disciplinary Connections." The third question sought to determine if and what pedagogical shifts were occurring as a result of iPad integration in the classroom. The corresponding category was entitled, "Pedagogical Shifts in Teacher Behaviors." The fourth and final question examined the types of student learning interactions observed among students as they used the device in their classes. An appropriate title for this category was "Learner Interactions."

Conceptual Framework

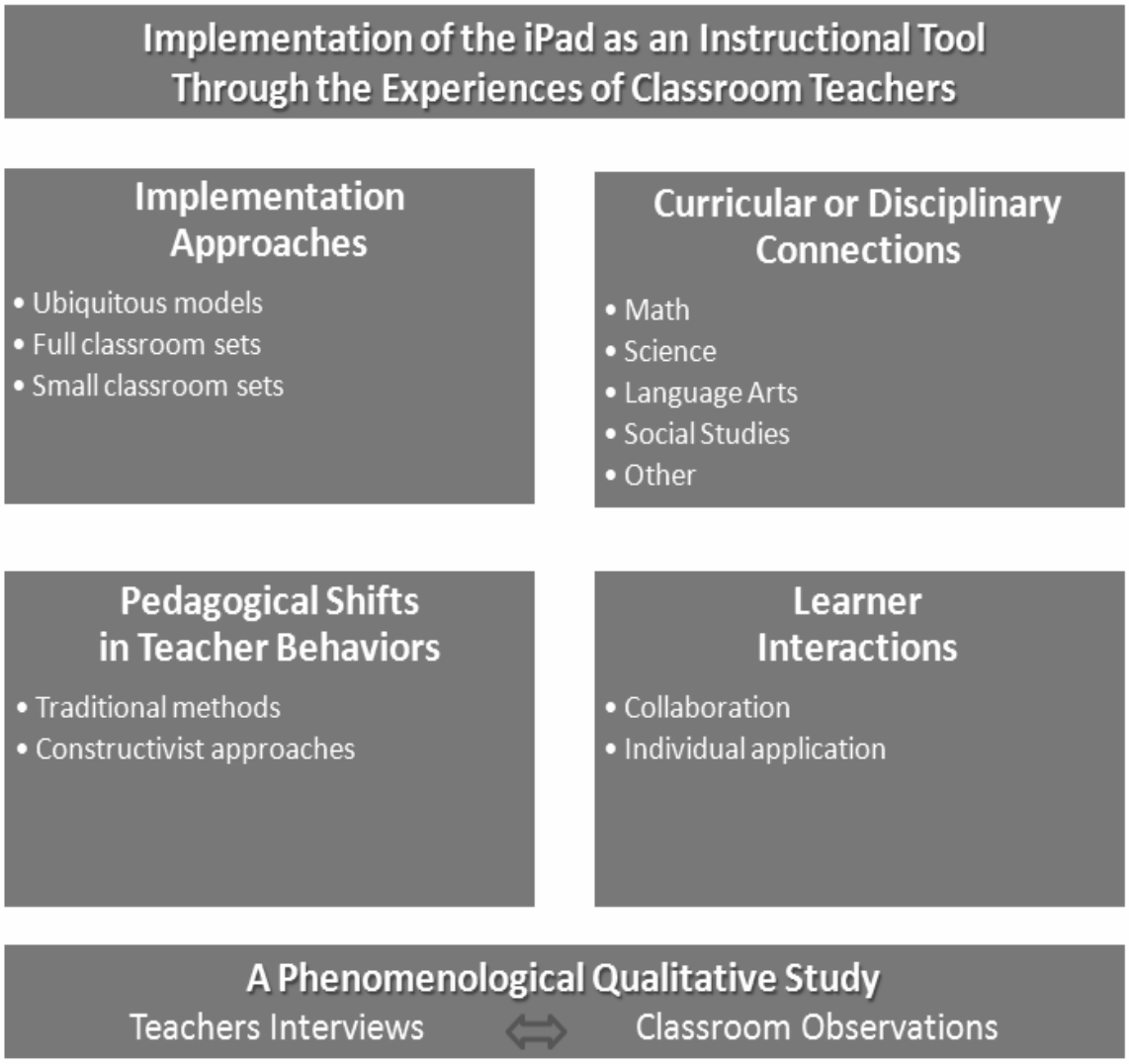


Figure 1. Conceptual Framework

Chapter Conclusion

Like the radio, all new technological tools experience their share of criticism, but mobile devices, like the iPad, have been embraced, adopted, and supported by many educators who want to provide their students with the 21st Century skills that will be needed in what will most definitely be a very technical future. The review of related literature has informed the researcher's understanding of the phenomenon in regards to the plethora of implementation models and designs that have begun in classrooms across this nation and beyond. Not only are schools struggling to fund new technology initiatives, they are also making decisions regarding accessibility to the devices and classroom integration approaches. Teachers, who seem to embrace technology and contend that it plays a vital role in the classroom, are attempting to provide opportunities to students that will advance their existing curricula goals, but are not necessarily changing their pedagogical behaviors or instructional strategies in the process. Student experiences remain consistent with those found in traditional classrooms, where new technologies are not available.

Although research is limited on the impact that the iPad will or will not have on education, teaching and learning, this phenomenological study will serve to increase our understanding of implementation, teacher pedagogical behaviors (and shifts, if they are occurring), and the student interactions and experiences occurring in classrooms where the devices are being implemented. This research will be accessible to educators interested in iPad initiatives and to educators seeking methods of implementation using various models. Insight into best practices related to the design of student experiences will also be available to inform new adoptions of mobile devices in schools.

Technology is woven throughout the fabric of American culture and our existence within a global society and economy. The examination of how evolving technologies influence teaching and student learning is key to our continued competitiveness within a technology-connected world. Educators charged with ensuring that students are adequately prepared academically and equipped with tools to enable life-long learning and job-readiness will benefit from this research and its impact in these areas.

Chapter 3

Introduction

The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. This topic was selected because research examining iPad implementation models and the experiences being provided to students involved in the initiatives in both public and private school classrooms are limited, due in part to the newness of this technological tool. Existing research related to this topic reflects the integration of desktop and laptop computers, the Internet, specific software, a myriad of Web 2.0 tools and software applications, as well as digital cameras and handheld devices. However, existing research that examines implementation models and student experiences using these technologies is inadequate or requires modification because the iPad possesses truly unique features and has only been available for purchase since April 2010. Therefore, researchers have had limited opportunities to examine the types of experiences teachers are designing for students using iPads in their classrooms. Because of the limited amount of data available to districts as consumers, funding iPad initiatives may seem risky. Additionally, school district decision-makers may also be wary of purchasing these types of devices in fear that they might quickly become obsolete, replaced by the next new gadget to flood the technology market.

One goal of this study was to examine the approaches that teachers are taking in implementing the devices as instructional tools in their respective classrooms. A second goal of the study was to learn how curricular or disciplinary connections are made in use of the device. A third goal was to determine if and what pedagogical shifts are occurring as a result of iPad integration in the classroom. A final goal of the research was to determine what types of student learning interactions could be observed among students as they used the devices in their classes.

For the purpose of this study, instructional tool is defined as an instrument used to aid a teacher in delivering course-specific content to students. The iPad is classified as an instructional tool. Pedagogy will refer to the actions undertaken by a classroom teacher to ensure that learning takes place. Pedagogy can encompass strategies, selecting curriculum and resources, and assessment or evaluation methods.

Gaps in the literature related to specific iPad implementation models and the device's use as an instructional tool are evident. Sufficient time to consider implementation efforts, product updates, and higher rates of adoption of the device by schools, makes the present time optimal for pursuing research related to this topic. Research was needed to determine how classroom teachers are using the iPad as an instructional tool, how teachers are attempting to make curricular and disciplinary connections, how their pedagogy is changing as a result, and the types of student interactions that are occurring as a result. Understanding of this phenomenon required an investigation of the approaches being used by teachers and the experiences that they are providing to students. The following four questions guided the research:

- How is the iPad being used as an instructional tool?
- How are curricular and disciplinary connections made?
- What pedagogical shifts in teaching, if any, are occurring?
- What types of student learning interactions are taking place?

This chapter describes the research study's methodology and includes an overview of the following areas: (a) selected research approach and rationale, (b) description of the data source accompanied by a discussion of the sampling approach, (c) overview of information needed to complete the study, (d) discussion of the research design, (e) summary of the research design, (f)

description of the process and strategies for data collection, (g) overview of the analysis of the data collected, (h) potential ethical issues, (i) trustworthiness and credibility issues, (j) limitations of the study, and (k) the timeline for completing the study. The chapter closes with a brief paragraph justifying the need for continued research geared at addressing advances to technology and their impact on educators and students.

Research Approach & Rationale

As noted earlier, the researcher used a phenomenological approach to data collection in this qualitative study. A qualitative research design was most appropriate for this study because it seeks to examine the experiencesof teachers involved in an iPad initiative at Jobs School District. According to Creswell (2007), "qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is inductive and establishes patterns and themes" (p. 37). Qualitative investigations are pragmatic and interpretive, focusing on how and why specific phenomena occur, seek to capture the lived experiences of participants through in depth contact, observations, and dialogue with those directly involved with the research problem (Marshall & Rossman, 2011).

The theoretical framework for this study reflects theories of both radical and social constructivism. Radical constructivism, forwarded by von Graserfield (as cited in Shank, 2006,p. 96), contends that knowledge is personally constructed by humans in an attempt to make sense of their experiences and to survive in the world. Similarly, social constructivists believe that how humans construct new knowledge is influenced by their prior knowledge, cultures, and social experiences. Because qualitative investigations are interpretive, the lived experiences of participants are personally constructed and reflect these contexts. In addition, the researcher who

seeks to find meaning in the phenomenon of study also constructs understanding based on his or her perspective, prior knowledge and experiences, and social interactions with participants.

Qualitative studies may employ different research approaches, such as phenomenology, grounded theory, case study, ethnography, and narrative studies. Although a phenomenological approach was selected for this study, alternatives were initially considered. A grounded theory approach was considered at length because a theory does not yet exist that can be used to direct best practices of implementation of the iPad in classrooms, models of implementation, teacher pedagogical strategies for integration, or student experiences related to the device's implementation. According to Shank (2006), grounded theory is a "method of building theory from the ground up" (p. 129). Existing theories related to integration are related primarily to older, often outdated, technology tools being used in classrooms. Research conducted using grounded theory could result in meaning being made concerning the implications of iPad initiatives, such as the one taking place in this study's particular school setting. However, the purpose of this study is to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. Because district models and goals for implementation of the devices vary, as do teacher approaches to implementation, an appropriate theory or model for implementation that could be applied to all schools could not be determined through this study.

After much internal deliberation, it was decided that a phenomenological approach would be most appropriate. This research approach was selected because it best reflects the purpose and goals of the research. The research setting is a rural public school located in a south-central state. The study utilized observations and interviews of teachers in their natural settings as the primary tools for data collection. These data-gathering approaches allowed the researcher to

examine the personal experiences of teachers as they implement iPads in their respective classrooms by interpreting their spoken words, body language, and actions.

The philosophical assumptions that underlie phenomenological studies were first promoted by the late German mathematician, Edmund Husserl (1859-1938), who believed that the source of human knowledge is the personal or first-hand experience of a phenomenon. Phenomenology, as a modern research approach, seeks to describe these personal experiences and reduce them to common threads, themes, or essences (Creswell, 2007). Researchers utilizing this method, "focus in depth on the meaning of a particular aspect of experience, assuming that through dialogue and reflection, the quintessential meaning of the experience will be revealed" (Rossman & Rallis, 2003, p. 97). When juxtaposed with quantitative assumptions, phenomenological research does not seek to test a hypothesis or consider correlations among variables that could affect research outcomes. The desired result is always a description of phenomenological events to promote deeper understanding for the identified audience.

A phenomenological design fit well with the researcher's goals to examine the lived experiences of teachers charged with implementing iPads as instructional tools in their classrooms because it provides a mechanism for discussing, observing, analyzing, and interpreting their unique and shared experiences in undertaking this initiative.

Sample or Sources of Data

The type of sampling that is commonly used in a phenomenological study is referred to as purposeful sampling. Purposeful sampling is best suited for this type of research because "qualitative researchers usually work with small samples of people, nested in their context and studied in-depth" (Miles & Huberman, 1994, p. 27). Purposeful sampling also serves to "inform an understanding of the research problem and central phenomenon of study" (Creswell, 2007,p.

125). The primary criterion for inclusion in this study is that participant-teachers be currently involved in the implementation of the iPads in their classrooms. Because this particular study examined implementation examples in place in Jobs School District, located in a south-central state, the sample could further be described as extreme or deviant, because wide-spread implementation of iPad initiatives is not yet a common practice in the United States.

This study was conducted at Jobs School District, located in a south-central state. The district's enrollment is approximately 4,000 pupils, of which over half qualify for free and reduced meals. The district's student population is comprised primarily of white students, but small numbers of black, Asian, Native American, and other ethnic groups are also enrolled. The district has been nominated and selected for a number of awards in recent years related to student academic performance.

During the summer of 2011, Jobs School District purchased six sets of thirty iPads for the middle school, seven sets of thirty for the high school, and one set of thirty for the junior high. The district has assigned the sets to teachers in literacy and geometry classrooms. Prior to the beginning of the 2011 school year, teachers in the district were encouraged to attend training pertaining to the device's implementation. Jobs School District administration has demonstrated a commitment to iPad implementation through its allocation of fiscal resources and professional development for this initiative. In a phenomenological study, it is critical that all participants have the experience of the phenomenon being studied (Creswell, 2007). An attempt was made to observe and interview each literacy and geometry teacher who was selected to implement these classroom sets of iPads. However, not all teachers were willing to participate in the study.

The researcher's rationale for selecting this site was based on her previous access to and relationship with Jobs School District. The researcher is currently involved in several

technology-related projects with the district's technology director. Additionally, she regularly collaborates with two of the district's media specialists on a number of instructional technology initiatives. The technology director arranged for the researcher's observations and interviews with district personnel in the past and ensured his assistance in facilitating future access. The researcher lives within the school district and her oldest child graduated from Jobs High School. Through her former position as director of admissions and clinical experiences at a local state university, she worked collaboratively with administrators and cooperating teachers in placing teacher interns within the district and monitoring their performances. The researcher felt that Jobs School District was an ideal site because of these reasons and because of their documented commitment to technology integration.

A tentative timeframe of 12 months or one year was decided on for the completion of the research. Written permission to complete the research was granted by the district superintendent and building level administrators at each school and specific participants were identified by the researcher. The research's proposal was submitted, subsequently revised based on the IRB committee's recommendations, and approved in the fall of 2012 (see Appendix A). All necessary letters and consent forms were prepared in advance and communicated to participants (see Appendix B). Participant-teacher identification was facilitated by each school's principal, the district's technology director, and media support specialists assigned to each school building.

Overview of Information Needed

This phenomenological study focused on examining implementation of the iPad as an instructional tool through the experiences of classroom teachers. Four research questions, guided by the conceptual framework of this study, were explored. The questions intended to guide the

collection of the information needed for analyses. The information needed to answer these questions could be grouped into the following three categories:

- Perceptual: Teacher perceptions of what they needed to know to effectively implement the devices and their methods and strategies for designing experiences for the students.
- Contextual: Teacher and student dialogue and behaviors that occurred while the iPad was integrated into the classroom curricula.
- Theoretical: An ongoing review of the literature intended to provide a theoretical background for this research.

Overview of Research Design

The following list itemizes the steps taken to complete this research study. In the sections of this chapter that follow, a more in-depth discussion of the most critical steps within the process is provided.

1. The researcher procured written consent from the administration at Jobs School District. An IRB, approved by the researcher's dissertation committee, was also submitted and approved for a one-year term. This process outlined all procedures and processes required for adherence to ethical standards of conduct, including confidentiality and consent forms (See Appendix A).
2. A comprehensive review of related research was conducted to determine the contributions of other researchers within the topics of technology and iPad integration in P-12 classrooms. The review of related literature has informed the researcher's understanding of the phenomenon in regards to the plethora of implementation models and designs that have begun in classrooms across this nation and beyond. Not only are

schools struggling to fund new technology initiatives, they are also making decisions regarding accessibility to the devices and classroom integration approaches. Teachers, who seem to embrace technology and contend that it plays a vital role in the classroom, are attempting to provide opportunities to students that will advance their existing curricula goals, but are not necessarily changing their pedagogical behaviors or instructional strategies in the process (Norris and Soloway, 2011; Quillen, 2011; WiredEducator.com, 2010). Student experiences remain consistent with those found in traditional classrooms, where new technologies are not available.

3. Potential research participants were initially approached by the Jobs School District building principals, the technology director, or by the media support specialists assigned to each of the approved participating schools. These participants were identified based on their selections to receive carts of iPads in their respective classrooms. Once identified, the researcher secured written consent from each participant, and scheduled observations in each participating classroom and semi-structured interviews with each participant-teacher. The researcher then set up a detailed schedule for completing the observations, interviews, and final report.
4. During the observations, the researcher observed and wrote field notes that documented the classroom settings, experiences providing to the students, the teachers' strategies for implementation, and the interactions that took place between students and between teachers and students. Participants were expected to behave as naturalistically as possible while the researcher was present in the classroom. The researcher began to review and code the data immediately following each observation.

5. The researcher conducted in-depth, semi-structured interviews using the attached interview protocol (See Appendix C), but deviatedwhen necessary to elicit additional data that might advance the research. Participants were encouraged to speak freely during the interviews and the researcher believes their responses werehonest and open. The researcher immediately began to transcribe the interviews and code the transcriptions using appropriate qualitative procedures.
6. The researcher reviewed, analyzed, and reflected upon the collected data, being reflexive, and flexible enough to continue to search for relevant data until satisfied and assured of the resulting themes, categories, and interpretations.
7. Upon completion of the analysis, synthesis, and writing stages, the researcher plans to review the study with educators as the intended audience, and with Jobs School Districtadministration and participants.

Data Collection Methods

Multiple methods were used to ensure that the identified research questions were adequately addressed in this phenomenological study. In qualitative research, researchers must rely on the use of multiple sources of information to ensure credibility and reliability (Marshall and Rossman, 2011). The analysis typically includes three components, used to ensure credibility: (a) data reduction to determine themes that emerge during coding, (b) data displays that provide the audience with a visual representation of the results, and (c) verifying and validating final conclusions (Suter, 2006). These three components are in place to ensure that the research and researcher are trustworthy, dependable, and credible. Therefore, this study included both teacher-participant interviews and classroom observations of teachers and students when iPads were in use. An additional method, approved by the IRB, was the use of focus

groups. However, the researcher decided that this method was not needed for this particular study.

Phase I: Identification of Participants

Written approval was granted by the superintendent of Jobs School District and the building level leaders at each of the school sites where the iPad initiatives are occurring. Additionally, written consent forms were developed for use with the participant-teachers and were submitted and approved by the IRB. The researcher worked with the district's technology director, as well as the media support specialists assigned to each school, to identify the teachers who were implementing the devices. The district informed the teachers that the research would be taking place and encouraged their participation. The researcher worked with individual teachers to schedule interviews and observations that accommodated their instructional schedules, as well as the schedule of the researcher. A calendar was developed and shared with participants once dates were scheduled and finalized.

Phase II: Interviews

For a phenomenological study, "the process of collecting information involves primarily in-depth interviews" (Creswell, 2007, p. 131). Through the collection of jottings and fieldnotes taken from observations and transcriptions compiled after in depth conversations and interviews, qualitative researchers are able to begin to generate preliminary analyses (Roulston, 2010; Emerson, Fretz, & Shaw, (1995). This data is further analyzed, examined, and synthesized into meaningful themes and topics to advance the understanding and interpret the meaning of phenomena in terms of the meanings that the people involved give to them. An additional characteristic is the use of small, focused human samples directly involved with a phenomenon of interest. The ultimate goal, then, is to facilitate human understanding and learning.

This study relied primarily on the data garnered using in-depth, semi-structured interviews of participant-teachers. The researcher developed and piloted an interview protocol that reflects the four research questions that this study addresses (see Appendix C). Colleagues in one of the researcher's advanced research classes also critiqued the interview protocol. As a result of these inputs, appropriate revisions were made. Some preliminary themes that emerged during the pilot interviews (which took place with elementary classroom teachers), were increased student motivation, teacher frustrations related to implementation and infrastructure issues in the schools, and curriculum implications.

Although phenomenological studies use a variety of interview structures along the spectrums of structured to semi-structured to unstructured formats (Roulston, 2010), the research sought to address the four research questions aligned to the study's purpose and selected a semi-structured interview format for this study. These types of interviews include an interview protocol that features a series of open ended questions that allow the interviewer to continue to probe the participants for deeper responses and detailed information. Although the same interview protocol was used with each participant, the order of the questions varied and allowed the interviewee to select his or her "own terms to formulate answers to the questions" (Roulston, 2010, p. 14). This means that participants are free to respond using the terminology or vocabulary that reflects their perspective in addressing the questions as opposed to trying to conform to the nomenclature, which can dictate responses to structured interview questions.

Phase III: Observations

The second primary method for collecting data was through classroom observations. Although humans are natural observers of their environments, observation as a tool still proves to be a difficult task for many qualitative researchers. There are basically three reasons why

some researchers struggle to observe effectively: (1) humans are geared toward “maintaining” a perceptual understanding of their surroundings, frequently failing to take note of normal activities that might provide insight into the lived experiences of our participants, (2) observation can be “intense and is usually very taxing,” requiring the researcher to pay attention to both normal and abnormal behaviors and environmental factors, and (3) researchers must be able to focus their observations both convergently and divergently, to ensure that all aspects of their surroundings are noted (Shank, 2006, p. 24).

Although a difficult task for some, observation is necessary in many qualitative studies because it is the only method that allows the researcher to witness first-hand the lived experiences of the participants. Through the act of observing, the researcher “learns about actions and infers the meanings those actions have for participants” (Rossman & Rallis, 2003, p. 195). Observations, then allow the researcher to view the phenomenon from either an insider’s or outsider’s perspective, to identify patterns in behaviors and emotions, as well as relationships among participants. Observations played a key role in assisting the researcher in understanding the issues and results that manifested during the iPad initiative at Jobs School District, as she was able to observe the interactions and dialogue that occurred among students and between the teachers and their students. An attempt was made to observe allteachers in their classroomsas they implementedthe iPads with their students. All participants but one was observed a minimum of two times. One participant discontinued use of the devices before the study began.

Data Analysis

The characteristics of a “good” qualitative study include rigorous data collection procedures and the analysis of data using multiple levels of abstraction (Cresswell, 2007). Because large amounts of narrative data were collected and analyzed throughout the research,

organization, abstraction, and synthesis are the most time consuming, detailed, and tedious steps in the study. It is imperative that qualitative researchers develop an organizational framework for identifying the essence, patterns, and themes that emerge from the data.

The phenomenological researcher must be dedicated to solicitous data reduction to arrive at the themes and essence of the lived experiences of those being studied. According to Miles and Huberman (1994), anticipatory data reduction occurs because researchers must decide "which conceptual framework, which cases, which research questions, and which data collection approaches to choose" (p. 11). Data reduction continues throughout the data collection period in a phenomenological study taking the researcher through a series of steps or procedures aimed at reducing the data to its rawest forms. These steps include: (1) transcribing, finalizing field notes, coding, and finally bracketing data into holistic categories, (2) further delineating themes or units and eliminating extraneous information, (3) clustering data into meaningful themes, (4) revisiting collected data to ensure that all relevant data has been identified or clarified, (5) using dialogue and observations to illustrate the identified themes or essence of the phenomenon (Miles & Huberman, 1994;Shank, 2006). It is important to note that this process can be cyclic and deep analysis requires the researcher to continuously revisit the original data to discern the major patterns that emerge.

The steps that the researcher underwent in analyzing this data began with transcribing the participant-teacher interviews. The researcher utilized a low-cost iPad application called *Audiolio* for recording the interviews. The app allowed for the secure recording of both text and audio notes, which were then downloaded to the researcher's personal computer for transcribing. The researcher also relied on written notes to record body language and environmental factors that could be relevant to the researcher when later coded.

All transcriptions were typed using Microsoft Word. The "review" feature available in this application allowed the researcher to simultaneously code the data into broad themes that were later categorized or grouped to reflect the corresponding research questions. The coded notes were searchable and this allowed for further analysis after emerging themes became evident.

An iPad app was also used at the beginning of data collection to record jottings. The app used was *Evernote*, which allowed the user to organize notes into researcher-created folders. All folders and notes were searchable and could be sorted into categories based on their contents. However, after determining that the researcher was not a fast enough typist using the iPad's built-in keyboard, it was decided to record further jottings using Microsoft Word on a laptop. The initial jottings were transformed into finalized field notes after each observation was completed and subsequently coded using the same methods described above. The final result of the transcriptions and field notes were thick descriptions, that when later analyzed, illuminated patterns in behaviors and conclusions to provide insight into the phenomenon.

The coding of the data into themes or patterns was ongoing and simultaneous. Additional interviews and observations were scheduled, when necessary, to confirm some of the themes and ensure saturation. The analysis processincluded the organization of the completed set of data to confirm that common themes and categories were present, abstracting links among categories. These links were compared and contrasted with issues identified in existing literature related to this research topic. A cross-participant analysis was also conducted to determine common and differing experiences among participants.

During the first cycle of coding, the complete data sets for two participants were coded using descriptive or topic coding to assist the researcher with determining what was talked about

during each interview or observed during each observation. This type of coding summarizes the basic topic of a passage of qualitative data (Saldana, 2011). The researcher used inductive analysis to identify major, emergent themes or categories related to the phenomenon. This process led to the development of a coding legend/schema (See Appendix D) that reflected the words and phrases that captured the most important aspects of the data. Within the coding legend/schema, the researcher clustered the data by grouping related words or phrases into major categories and sub-categories that were given holistic names that described the theme or issue in the data. This type of coding is referred to as holistic coding because it "applies a single code to each large unit of data in the corpus" to describe the overall contents (Sandana, 2011, p. 118). It is important to note that these holistic categories were reviewed multiple times with reference to the established research questions, conceptual framework, and the limited literature that was available.

The researcher then proceeded to conduct a second cycle of analysis, during which all data were reviewed again and coded using the holistic codes established within the coding legend/schema. The researcher also used the highlight tool to identify relevant dialogue or observational data that might be used in the findings. After coding each data set, the researcher denoted responses of each participant in a data summary database (See Appendix E), which was designed to reflect the categories and sub-categories identified during the first cycle of data analysis. Additionally, the researcher created summary forms for each participant's data set that provided a holistic overview or data snapshot of what was learned of each participant's experience implementing iPads as instructional tools.

The final step was obviously interpreting and discerning meaning from the organized chunks of data that were collected during the study. This of course, required that judgments

regarding the processes teachers underwent during implementation of the device, as well as their strategies for incorporation in curricula, pedagogical shifts, and perceptions of the device's usefulness in regards to student learning, be made and adjusted along the way. This process of distillation resulted in the identification of five major findings. A discussion of the five findings is presented in chapter 4. A synthesis of the interpretations of these findings is presented in the final chapter.

Ethical Issues

In any type of research that involves human participants, ethical issues that might arise must be considered prior to the collection of any data. In recent years, qualitative research has experienced a shift in the perceived role of the researcher as one who frequently participates in the study, as well as a shift in the description of the humans from "subjects" to "participants" (Rapley, 2007, p. 23). These shifts indicate a new respect for the rights of participants, and acknowledge the influences and biases that the researcher may pose to the study.

The researcher must ensure that the rights of participants are protected throughout the study. This involves keeping the participants informed of the purposes and intent of the research, as well as making sure that informed consent is acquired from each individual. Further, the data collected must be presented in a format that protects the privacy of the participants.

For this study, an informed consent form was developed, critiqued, and revised to reflect suggestions made by the researcher's methodologist, cohorts, and the IRB committee who reviewed the IRB proposal. The informed consent form was shared with Jobs School District administration and found to be appropriate for use in the study (See Appendix B). The form reflects the purpose and goals of the study, as well as the rights of the participants. The form clearly states that all information will be kept confidential to the extent allowed by law and

university policy. The school district was assigned a pseudonym, all participants were assigned pseudonyms upon return of the consent forms, and all references in the final report were made using the assigned pseudonyms. All data were stored on the researcher's personal hard drive, which is password protected. Any identifying data will be subsequently destroyed upon the completion of the research project. If the results of this study are to be written for publication, no identifying information will be used. Written voluntary consent from all participants was received before any data collection began.

Some ethical issues that had the potential to arise when conducting this study were that some participantsmight feel coerced to participate in the study because they had received iPads and were expected by the district to use them. There also existed the possibility thatnot all teachers supported the device's implementation and might not wish to incorporate their use in their classrooms. If one of these teachers had beenidentified as a potential participant, then he or she might have felt pressured to perform in an unnatural manner. These same individuals might feel some concern about administrator awareness of their reluctance to integrate the devices, or the manner in which they were using them (personal purposes vs. academic, or student learning). Voluntary participation and informed consent were necessary to ensure that this did not occur. The participants were assured by the researcher that their responses to interview questions would remain confidential.

Trustworthiness

Because phenomenological researchers seek to learn the multiple perspectives of those experiencing a phenomenon, they search for multiple truths, instead of one specific conclusion or conclusions (Rossman & Rallis, 2003). Miles and Huberman (1994) offer 26 tactics for researchers to use when verifying the truths that emerge from any type of qualitative study.

These tactics are categorized into those that relate to objectivity/conformability, reliability/dependability/auditability, internal validity/credibility/authenticity, external validity/transferability/fittingness, and utilization/application/action orientation. Each of these tactics forces the researcher to reflect on his or her own practice in collecting and organizing the data, extracting and synthesizing themes and patterns, and then reporting the truths that emerge as a result of the collected data.

In much the same ways that quantitative researchers validate their findings using correlations among variables and other results from numerical data, qualitative researchers must provide evidence to substantiate their conclusions. Rossman and Rallis (2003), advocate five strategies for ensuring credibility and rigor within a qualitative study. These strategies are discussed and applied to this research in the paragraphs that follow.

Triangulation

This phenomenological study only examined the lived experiences of teachers and students involved in an iPad initiative at one site — Jobs School District. Because this research is limited to an extent by the specificity of the setting, it was critical that the researcher triangulate the data by using multiple data collection methods and by obtaining multiple perspectives on the iPad initiative taking place in the district. The researcher interviewed every teacher identified to receive an iPad and who was willing to participate in the study. The researcher followed the interviews with classroom observations to facilitate a better understanding of the experiences created for students by the teachers who were interviewed, as well as to capture the dialogue that occurred among the individuals in the classroom.

“Being There”

In order for one to understand a phenomenon well enough to convey its significance to others, a researcher must spend an extended amount of time within the setting, meeting, conversing, and observing those involved and living the experience. To this end, the researcher spent approximately three months working in close contact with the participants at Jobs School District.

Participant Validation

Member checks are imperative to qualitative research as they provide participants opportunities to review their own comments and behaviors, in an attempt to clarify their meanings and perspectives to the researcher. Follow-up interviews and observations were scheduled with participants that provided for opportunities to review research as it unfolded. Additionally, email correspondence between the researcher and each participant was ongoing. Transcripts were shared with participant-teachers via email or in person and critical or candid feedback was encouraged by the researcher.

Using a Critical Friend

The best peer reviewer for a researcher working on a dissertation study is undoubtedly a cohort member within the same program of study. Because the majority of the researcher’s coursework was completed online, she was limited in this capacity. However, a colleague in the researcher’s office was also in the process of completing her own doctoral research and the two collaborated in sharing research and sources of information.

Using the Community of Practice

The data and emerging themes that surfaced were shared with colleagues within the technology groups of which the researcher is a member. One group included the technology

director and two of the media specialists from the district. These groups understand the devices and the implementation struggles that some teachers face in their attempts to integrate the iPads. These colleagues were willing to assist the researcher with understanding the phenomenon and the experiences that the teachers provided to the students.

Limitations

Because this study focused on the implementation model taking place in a single school district, Jobs, limitations of the study must be considered. The lived experiences of the teachers and students involved in this study may not be necessarily transferable to other districts in the nation implementing their own iPad initiatives. However, it is believed that the research will still provide a useful insight into the use of the iPad as an instructional tool.

An additional limitation to be considered was the possibility of bias representation of the data findings on the part of the researcher. The researcher is an educator with a history of being very pro-technology in the classroom. Care was taken to ensure that her presumptions about the experiences, curricular connections, human interactions, and pedagogical shifts of those involved did not influence the truths that emerged from the data.

Chapter Conclusion

Technology is woven throughout the fabric of American culture and our existence within a global society and economy. The examination of how evolving technologies influence teaching and student learning is key to our continued competitiveness within a technology-connected world. Educators charged with ensuring that students are adequately prepared academically and equipped with tools to enable life-long learning and job-readiness will benefit from this research and its impact in these areas.

Chapter 4

Findings

Introduction

This study sought to explore the phenomenon of how classroom teachers are approaching the integration of iPad technology in their classrooms. The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. It is anticipated that the knowledge generated from this research will provide new insights into the impact of the device on teacher pedagogical behaviors and student learning experiences to inform integration practices in educational practice. This chapter presents five key findings obtained from eight in-depth interviews and 14 classroom observations. At the onset of the study, four research questions were specified:

1. How is the iPad being used as an instructional tool?
2. How are curricular and disciplinary connections made?
3. What pedagogical shifts, if any, are occurring?
4. What types of student interactions are taking place?

This study was conducted at Jobs School District, located in a south-central state. The district's enrollment is approximately 4,000 pupils, of which over half qualify for free and reduced meals. The district's student population is comprised primarily of white students, but small numbers of black, Asian, Native American, and other ethnic groups are also enrolled. The district has been nominated and selected for a number of awards related to student academic performancein recent years.

During the summer of 2011, Jobs School District purchased six sets of thirty iPads for the middle school, seven sets of thirty for the high school, and one set of thirty for the junior high. The district has assigned the sets to teachers in literacy and geometry classrooms. Prior to the beginning of the 2011 school year, teachers in the district were encouraged to attend training pertaining to the device's implementation. Jobs School District administration has demonstrated a commitment to iPad implementation through its allocation of fiscal resources and professional development for this initiative. In a phenomenological study, it is critical that all participants have the experience of the phenomenon being studied (Creswell, 2007). Seventeen teachers involved in the district's iPad initiative were identified as possible participants by school district administration. Only eight teachers, however, were willing to participate in this research study.

The eight teachers who volunteered to participate in the study represented three academic disciplines and three school building levels (middle, junior, and high schools). The teachers were interviewed and observed implementing iPads with students in their classrooms. In most cases, teachers were observed multiple times. One participant was not observed because she had elected to discontinue using the device in her classroom prior to the study. The researcher conducted in-depth, semi-structured interviews using an interview protocol (See Appendix C), but deviated when necessary to elicit additional data that might advance the research. The researcher then transcribed the interviews verbatim. During the observations, the researcher observed and wrote field notes using a laptop computer in order to document the classroom settings, experiences providing to the students, the teachers' strategies for implementation, and the interactions that took place among students and between teachers and students.

During the early stage of data analysis, the data were read and reviewed repeatedly. During the first cycle of coding, the complete data sets for two participants were coded using

descriptive or topic coding to assist the researcher with determining what was talked about during each interview or observed during each observation. The researcher used inductive analysis to identify major, emergent themes or categories related to the phenomena. This process led to the development of a coding legend/schema (See Appendix D) that reflected the words and phrases that captured the most important aspects of the data. Within the coding legend/schema, the researcher clustered the data by grouping related words or phrases into major categories and sub-categories. It is important to note that these sub-categories were reviewed multiple times with reference to the established research questions, conceptual framework, and the limited literature that was available.

The researcher then proceeded to conduct a second cycle of analysis, during which all data were reviewed again and coded using the codes established within the coding legend/schema. After coding each data set, the researcher denoted the responses of each participant in a data summary database (See Appendix E), which was designed to reflect the categories and sub-categories identified during the first cycle of data analysis. Additionally, the researcher created summary forms for each participant's data set that provided a holistic overview or data snapshot of what was learned of each participant's experience implementing iPads as instructional tools. This process of distillation resulted in the identification of five major findings. A discussion of the five findings is presented in the next several sections. The last section consists of a chapter summary intended to review the findings and summarize the data.

Discussion of Findings

Five major categories and several sub-categories were established for coding the data. Through data analysis, five major findings emerged that reflect the four main research questions identified earlier in this chapter. The specific research questions are referenced in parentheses following the finding to indicate an alignment. The five major findings that emerged from this study were:

1. The majority of participants (7 of 8 [88%]) indicated that they received limited professional development or training on implementing the devices in their subject areas during the pilot year. More than half cited that they relied on colleagues for support in integrating the iPads in their classrooms (R1; R3).
2. All of the participants (8 of 8 [100%]) failed to demonstrate that implementation of the iPad as an instructional tool had influenced their pedagogy or teaching (R1, R3).
3. All eight participants (8 of 8 [100%]) facilitated curricular connections that reflected and addressed content or subject area goals (R2).
4. The majority of participants (6 of 8 [75%]) indicatedthat they relied on students, at some point during the implementation, to assist or support the use of iPads in their classrooms (R4).
5. All of the participants (8 of 8 [100%]) expressed their beliefs that the device had a positive impact on student engagement. Most participants (6 of 8 [75%]) also believed the device had or would have a positive impact on student learning (R1, R2, R3, R4).

Each finding is describedin detail in the sections that followand includes representative quotations from the semi–structured interviewdata,as well as descriptions of the observed behaviors and dialogue that occurred among teachers and students involved in the iPad initiative. The researcher attempted to document the broad range of participant experiences in an effort to assist the reader with better understanding the phenomenon. The emphasis is on letting the participants express their experiences in their own words. When appropriate, data collected during classroom observations are also included to supplement or enhance the reader's understanding.

Finding 1: The majority of participants (7 of 8 [100%]) indicated that they received limited professional development or training on implementing iPads as instructional tools in their subject areas during the pilot year.

The overarching and primary finding of this study is that the majority of participants indicated that they received limited professional development or training on implementing the devices in their subject areas prior to implementing the devices. This finding is significant in terms of the number of participants (7 of 8 [88%]) who expressed that they either did not receive training at all, or that the initial training that they received was limited to instruction regarding the basic operation of the device. Based on participant descriptions, administration expected individual teachers to determine how the devices could be integrated into their respective curricula. Among the comments cited were those by Karen, who described the training she was provided prior to implementation in the following manner: "Very, very little. Actually, before school was out, they brought you an iPad and said, 'Here, learn. Get familiar with it,' and that was it. That *was* the training! There was *no* training!"

Another participant, Patricia stated that she received very little training, but unlike Karen, she had already purchased an iPad for personal use and was familiar with its operation and with some of the apps. Although comfortable using the device for personal tasks, Patricia went on to confide that the training that she received on using the cart of iPads with her students "could have been better." She stated, "So they brought it to me in the cart. Um, they came over and gave me about five minutes of training on the cart. That could have been a little better, but in their defense though, our tech guys are PC-oriented and obviously this is a Mac."

Several participants also stated that the training that they received was either brief, insufficient, or attended on a voluntary basis. Michelle, who described her initial training as "quick" and limited to basic operation of the device and an introduction to some of the apps that teachers might consider for use in their classrooms. Beth, who described her prior experiences using technology in the classroom as "pitiful," shared that although she did receive "some" professional development, it was insufficient in preparing her to implement the device. She said:

> Where people like *me,* … us older ones, our comment was every time we went to a technology training was, "If we could sit through this *very same* workshop two or three times, you know in a close proximity of time, you know, we would probably come out a lot more prepared," but *one* workshop, you know, just is not sufficient for us.(laughs) I mean, we're still overwhelmed!

Another participant could not clearly recall ever attending any training prior to initially implementing the devices. She confided:

> I guess a lot of districts do this, probably. It's, "We're going to get them. We're going to figure it out."*Now*, they're beginning to offer more trainings. We did have somebody come in. [He] came in and just did a couple of hours. Well, he came in, actually it was in

> *my* classroom, and just for the people that had *that* conference period, so you just did one thing, *briefly*, just to kind of show teachers some of the apps that were available…and then he did come back on an another staff development day and do several hours, but I had to be at a [different] training so I wasn't able to go to that. (Jennifer)

Only one participant stated that she received in-depth training on use of the iPad within her curricular area. She stated that she was issued a single device and attended a full day of training sponsored by the school district two years prior to implementing a cart of devices in her classroom.

Because most of the professional development offered was limited to basic training in operation of the iPad, the majority of participants (6 of 8 [75%]) expressed that they sought content-specific support or assistance in implementing the devices from colleagues (See Table 1). While one participant stated that her principal had assisted her on a few occasions, most participants expressed that they had shared ideas with other teachers within their disciplines or relied on their building media specialists for support in selecting and using particular apps in their classrooms. Sandra said that the school schedule does not allow her to actually collaborate with other teachers in her subject area, so she plans with them via email. She said, "When one of us finds something that's really good, we send an email really quick to all of the others and say, 'Check this out! This is what I found.' and that sort of thing." Beth, who co-teaches in a classroom that serves students receiving special education services, said that she first watched and assisted the other teacher in the room with using the app with students before attempting implementation on her own. After she felt comfortable, she used the same app in a different class that she teaches alone. She said, "So, I thought, 'We can handle that! We're going to try that!'"

	Professional Development		
Participant ID	Received Adequate	Did Not Receive	Received Some
P1			**X**
P2			**X**
P3		**X**	
P4	**X**		
P5			**X**
P6		**X**	
P7			**X**
P8		**X**	

Table 1: Professional Development Reportedly Provided to Participants

Participants from all three building levels mentioned that they had been supported at some point during the pilot year by their school's media specialist. Patricia said that her principal allowed her a day off to spend with the media specialist "to look for apps before I gave them to the kids to use on a daily basis." She said that they spent the time exploring productivity and management apps such as *Dropbox* and *Edmodo* that could be easily integrated into what she was already doing and teaching in her classroom. Similarly, Linda shared that her media specialist conducted research on what other teachers were doing with the devices and then showed her free apps that might work in her subject area. Other participants mentioned that their media specialist had offered brief trainings at various points in the pilot year that focused on apps for consideration or apps that had already been installed on the carts.

The lack of, limited amount, or type of professional development experienced by the majority of teachers may account for the difficulty that half (4 of 8 [50%]) of the participants

experienced implementing the devices in their classrooms. Participants described their struggle to use the devices in the following manner:

> So, I was excited, but in the beginning, I didn't know what to do with them. So, it was like the second nine weeks before we started using them ... so the cart was here, and like I said, it just kind of stayed, just hanging out the first nine weeks because nobody was sure what to do with it. I wasn't sure what to do with it. (Patricia)

Jennifer, who stated that she was not afraid to use technology in her classroom, found implementing a shared cart of iPads to be "scary" because she did not have access to the devices prior to using them each day. She confided, "It's just that not having them down here, it's hard for me to plan exactly what I want to do on them. So whatever apps are onthe cart, I want to make sure I have those same apps on my *own* iPad, so that I can test them out first." Jennifer went on to share her concerns about finding appropriate apps for her discipline, "There's a lot of what you can do to practice your skill, but really for the students to just be independent and learn a skill, there's just not. You know, I haven't really figured out *how* to do that yet." Beth expressed similar frustrations. She said:

> I am just not comfortable, and I run into a problem, and then there's the end of my lessons! So I've got to work out all of that, the bugs! My frustration is, I can pick up a book and I can read it. I can read the instructions and I can go from there. I take the iPad and I don't' know what to do. Where do I go from here? Where do I go to see what to do? You know, and you feel like an idiot when you're standing there.

Finding 2: All of the participants (8 of 8 [100%]) failed todescribe experiences that demonstrated that implementation of the iPad as an instructional tool had influenced their pedagogy or teaching.

Given that the professional development that most participants received was directed at assisting them in understanding how to operate an iPad, it is not surprising that participants did not experience a pedagogical shift in their teaching as a result of implementing the devices in their classrooms. In all cases, teachers described or students demonstrated iPad activities that were similar to those that the teacher had used prior to implementation (8 of 8 [100%]). Patricia admitted, "I have tried to just use the iPad in with what I have already done … it's basically been an electronic, you know, note taking device, which I realize is not the greatest use of it." Karen shared that she used the iPads for one primary purpose, novel reading. After she had her school's media specialist assist her with finding an appropriate novel to download to the devices, she ordered "supplementary materials" to go along with the book instead of looking for comparable apps or other resources available on the device.

The majority of the participants also shared that a major application of the iPad in their classrooms was for research. Six participants described specific instances when they had required students to look something up or conduct research on a topic. Mary, who had previously checked out the "computers on wheels (COW)" for research purposes, said that she now preferred to use the iPads because they provided better Wi-Fi connectivity than the other option. During one observation of her classroom, students were conducting research on a teacher-specified topic and recording their findings on worksheets. Michelle, who once took her students to the school's computer lab when they needed to do research, said that she had asked students in her classes to use the iPads to read about folk tales on a specific Website, and then "write a short paper using the information that they found on that site." She also shared that the students did not write the papers using the iPads, but turned in a "hard copy" instead.

It is interesting to note that half of the participants (4 of 8 [50%]) stated that they felt that a pedagogical shift had occurred in their teaching as the result of implementing the devices (See Table 2). When asked if she felt that her pedagogy had been impacted, Sandra said, "To be honest, I feel like I'm more excited about it [teaching] and I feel like the students have more positive energy." She noted that the major change that had occurred was that she could provide the students with "limitless access" to the Internet "to use with any lesson at this point." When the researcher asked Sandra to further describe the types of iPad activities she had designed for students during the year, she discussed activities that were consistent with those that were in place prior to implementing the devices. For example, Sandra required students in her class to develop PowerPoint presentations to review a novel on character analysis before she was issued a cart of iPads. Now, she requires students to use Keynote, an app similar to PowerPoint, available on the iPad to develop their presentations.

	Pedagogical Shifts		
Participant ID	Experienced	Did Not Experience	Unsure
P1	**X**		
P2		**X**	
P3			**X**
P4	**X**		
P5	**X**		
P6		**X**	
P7	**X**		
P8		**X**	

Table 2. Participant-reported Pedagogical Shifts

Mary, who described her pedagogy as being "enhanced" since implementing the devices, expounded to describe how the experience was influencing student attitudes toward learning.

She said, “They are very excited when they see that the iPads are in the room. They are hard to contain and hard to settle down, but they are great when you get them in their hands. They are focused and they are working.” It is important to note that Mary utilized constructivist approaches to student learning before and after implementing the devices in her classroom. She described some recent hands-on activities the students had completed in the following way:

> Today, we used an application called *RCB Travel* and it’s for building roller coastersby segment. So the students are implementing the laws of physics that they have learned over the past two weeks. We’ve built roller coasters in the classroom using tubing and marbles. We’ve built air rockets and we’ve shot those. They’re called stomp rockets. You stomp on a water bottle and it projects the rocket in the air. We did those outside. So they’ve had a lot of experience, hands-on.

In all four cases where participants stated that they felt that their pedagogy had changed as a result of implementing the devices, the activities that they designed for students did not demonstrate that the iPad had an influence on their teaching. Teachers still relied on methods and activities that were comparable to those utilized prior to integrating the devices in their classrooms.

Of the remaining four participants, three participants (3 of 8 [38%]) admitted that their pedagogy had remained uninfluenced. Karen confided that although she believes the iPad is a good tool, she doesn’t feel that it’s the “answer for everything.” She stated simply, “I guess it’s just not my style. I guess I’m old, old, old school and I’ve just got my other ways I like to do things.” Similarly, another participant said:

> I want it to be influenced *sobad.*(sincere expression) I do. I have things in my mind that I want to do and change, but it just hasn’t come to fruition. I want to teach more, you

> know, like I said with activities, and kids being interactive, and because *I know* kids learn better that way. When they see it, touch it, feel it. It just hasn't, it hasn't come through for me yet. (Patricia)

One participant said that she wasn't sure if her pedagogy had been influenced by the device. Linda, who described herself as new to the teaching profession, implemented the iPads on a regular basis in her classroom during the pilot year. She reflected on her pedagogy, "Every year has changed and gotten better, so I don't really know if it's just because of the iPad, or if I was willing to embrace the iPad and it's all worked together. I'm not sure."

Within the topic of pedagogy, it is important to note that student grouping for task completion remained consistent with the arrangements in place prior to implementation of iPads. The majority of participants (6 of 8 [75%]) designed and facilitated activities that did not facilitate collaboration or interaction among students. When describing the types of math activities that she had used with her students and the devices, Jennifer said, "So far, the things that they've done, they haven't really been interacting with each other. It's really been more independent. They haven't used them in like a group setting or partner setting." Jennifer shared that she had also used one iPad, connected to her SMARTBoard to play a whole-class review game where random students were allowed to volunteer answers. Michelle described her approach to using the devices in a similar way. She said, "I haven't used them in a group yet, and they've just been required to use them on an individual basis. I haven't had any interactions (among students) in my classroom.

Two participants, however, did facilitate activities that required students to collaborate during an activity. Mary asked students to complete research and then organize what they had learned in preparation for an upcoming debate on alternative fuel sources in her science class.

Sandra also required students to work in groups to read and answer questions about a common book. The students were then required to compile what they had learned into a Keynote presentation to be presented to the entire class sometime in the future. In each of these two classrooms, student desks were configured in an arrangement that facilitated group activities and students were allowed to discuss what they were studying and learning. In the remaining six classrooms, desks were arranged in straight rows and students were asked to complete tasks quietly as individuals.

Finding 3: All eight participants (8 of 8 [100%]) facilitated curricular connections that reflected and addressed content or subject area goals.

One area that the researcher sought to examine was how teachers were designing activities that connected to their curricular or disciplinary content. In all cases, teachers described or students demonstrated iPad activities that reflected content-specific goals or curriculum standards (8 of 8 [100%]). Mary described the process that she followed in planning lessons that integrated iPads into her science curriculum in the following manner:

> First of all, you have to have a good lesson. You have to know exactly what you want the students to learn, the goal of the lesson. I do not necessarily build a lesson around technology. I incorporate that into what the learning experience should be.

Most teachers (5 of 8 [63%]) also mentioned during their interviews that their iPad lessons reflected state frameworks, the Common Core Curriculum, or prepared students for state-mandated standardized tests aligned to those standards. Sandra, an English/language arts teacher, reflecting on her planning process, stated, “We have the Common Core now, so everything is pretty much laid outtelling you what your essential question is, what your critical vocabulary is. So, I just focus on ways that I can pull from that.” Jennifer and Karen, also

English/language arts teachers, articulated similar processes and stated that the novels that were selected for integration were those that were recommended or correlated to the Common Core Curriculum.

Patricia, however, mentioned several times that her primary concern was preparing her mathematics students for the end-of-course exam set for the middle of spring. Although she attempted to integrate iPads several times a week, her lessons reflected a focus on test preparation and balanced use of the devices with non-technical activities. She said, "I couldn't just throw away what I was doing. I had to kind of integrate it into what I was doing, without getting into a situation where I wasn't teaching as much material as I know I have to teach every day."

Exactly half of the participants (4 of 8 [50%]) also incorporated the use of specific iPad apps intended to review or practice previously learned content or skills. Two participants mentioned the incorporation of an app called *Grammar Dragon*, in which students reviewed the parts of speech in a game-like format. The teachers set difficulty levels for individual students, and then required students to achieve a certain percentage goal before they could stop interacting with the app and move on to another activity. Another teacher created an exam using an app called *Socrative* that allowed the students to login using individual accounts and assess their level of proficiency in the area of sentence formation.

In one participant's math classroom, students were observed playing two game-like apps that were intended to provide a drill-and-practice review of previously learned content. One app was published by the same company that produced the students' math workbooks and that aligned with what they were learning in class. The app, *Everyday Math – Fractions*, required students to identify fractions that were equivalent. The students competed for the highest score.

During the second half of the class, students played an app called *Beat the Computer – Multiplication*, for which students tried to solve a mental math multiplication question faster than the app's built-in calculator. Students also competed for the high score and the teacher kept track of who was leading in the competition. The teacher expressed that she was not completely satisfied with the apps that she had selected for the students to use. Jennifer said of one of the apps, "The game is pretty low-level and basic. I've had a hard time finding apps that are appropriate for [the grade levels I teach]."

In contrast to Jennifer's comment, the majority of participants (5 of 8 [63%]) cited content-specific examples that exemplified their beliefs that iPad integration was well suited for their specific disciplines. Participants framed their perspectives in the following way:

> I think it's (iPad integration) very suitable … For instance, writing about science. I try to pull in a lot of artwork…and you can tell by looking around that I do a lot of artwork and hands-on activities to learn science concepts. If you are willing to do that and not just stick to textbook learning, then the iPads are very applicable. (Mary)

> Wonderful! It's *perfect* for my classroom, especially for things like reading students' handwriting. There's no problem with that now, because they type. Correcting grammar, spelling, punctuation. I click on it, I underline it, and they know that this needs to be fixed … I don't have to have four or five different pieces. I've got a grammar book*right*here (points at iPad), and I don't have to go to the library to type anything up, print anything off, do any research. It's perfect! (Linda)

Three participants cited reasons that they believe that iPads might not be well-suited for their particular content areas. Patricia confided, "If it was a one-to-one experience, it would be

so well-suited. (Laughs softly) The *justclassroom use* situation has really kind of gone down hill. Seriously. The kids don't really even like it anymore." Jennifer, who teaches within the same discipline, corroborated Patricia's sentiments when she stated, "From what I've seen so far, I think there are probably better subject areas that it would integrate better with. I just don't see that many apps, right now, that could be used other than for the remediation and the reinforcement."

In addition to using the devices to facilitate curricular connections, the majority of participants (5 of 8 [63%]) also shared that they had allowed their students to play non-academic apps on the devices at some point during the year as an incentive or award for completing content-related tasks or lessons. These opportunities were usually limited to a few minutes at the end of the class period when work had been completed.

Finding 4: The majority of participants (6 of 8 [75%]) indicated that they relied on students, at some point during the implementation, to assist or support the use of iPads in their classrooms.

The majority of teachers (6 of 8 [75%]) expressed that they had received assistance or support for iPad or app use from students during implementation. In one building in particular, this was evident. The middle school had in place a student "geek squad" that consisted of 6th and 7th grade students chosen based on their grades and technology capabilities. The "squad" of students varied throughout the day as they rotated by class period. They were responsible for updating the carts, installing apps, performing basic maintenance, and assisting teachers when needed. According to Sandra, if she had her students working on a project or some kind of research activity and needed assistance, she would send the principal an email that said, "I need two of the Geek Squad members during second period, third period," and he would send them to

her room to work. The other participants in the middle school also mentioned that the group of students was responsible for delivering the devices to their rooms and picking them up at the end of the day, as the shared carts of devices were kept in a secure location overnight.

However, the day-to-day assistance reported by most participants consisted of help with the basic operation of the iPad, or with an individual app by students in the participants' classes. Michelle, for instance, stated, "When I run into problems, *a lot* of times, I can go to students in the classroom who can help me navigate through them." Similarly, Linda shared, "They don't all have iPads. So, we figured it out together. They tell *me* most of the things. They're like, 'Well, all you have to do is this…' So, I'm like, 'Well, okay!' They teach me most of it!"

Beth probably described how much student support meant when she shared an incident with the researcher regarding the difficulty some of her special education students were having with one of the apps. She said that the app that they were using, *Grammar Dragon*, was frustrating to these students in particular because it was timed and they had trouble processing the information before their time elapsed. She described the incident this way:

> They were already struggling with the concept of parts of speech, and then put it into a timed game! One little boy… he was about to shut downbecause he was so frustrated and overwhelmed, didn't know his parts of speech, and wasn't quick enough processing to figure it out. And he was ready to just push it back, get rid of it. One of the other students, while she was working it, that there was a way to *pause* the game so they had time to process and think about your answerand it didn't eat into your time. So that was … information that they shared with (the other co-teacher) and I. They were like, "You can pause it by doing this…" Well, now then, we shared that with the classes as we dealt with that.

Although not all of the teachers stated that they received direct support from their students, students were observed supporting other students in the use of the devices in all eight classrooms (8 of 8 [100%]). During an observation in Patricia's math classroom, the researcher observed one student ask for help with performing a figure rotation using the iPad. Before Patricia could respond, another student shared her "trick" for rotations, and illustrated how to hold the fingers in a specific spot on the screen before rotating. Later in the same observation, a different student stated that she did not understand a concept, so a male student left his seat and knelt beside the struggling student's desk to assist her. He explained how to work the problem to the female student. The teacher approached the students and listened, but did not assist because the male student was accurately assisting the female with the problem.

Mary and Karen both acknowledged that in their classrooms, they learned alongside the students. They stated:

> These kids! These kids are *way* smarter than I am! So, by allowing them to figure it out on their own and learn from each other, they are *so much* faster than what I could train them to do. There are a few things that a couple of students taught us today that, for instance, the mute button on the side, we learned about that. Even if you have the volume up, if the mute button is flipped over, you aren't going to hear any sounds. So we *all* learned about that. (Mary)

> Like when we would do vocabulary, and they'd (the students) say, "Well, just look up your dictionary entry," and then they'd go, "Well, how did you know that?" and they were talking back and forth and they were showing each other how you could go and tap on it twice and the dictionary would pop up and you could go and look up the definition

> … They were talking amongst themselves, "Yeah, show me how you did that!" And so, they did a lot of talking among themselves, just teaching each other how. Like I said earlier, they taught me as much as I taught them about *how* to use it and *what* was on it. … We just stumbled through it together. (Karen)

In addition to describing incidents in which students supported them or other students in the classroom, the majority of participants (6 of 8 [75%]) also indicated that they did not have to train their students in the use of the iPads before they could begin using them as instructional tools. As Mary put it, "There really wasn't a lot of training involved. You put it in their hands, and they work it." Sandra expressed a similar sentiment but attributed student proficiency in using the devices to the fact that so many of her students had iPhones or other smart phones prior to using iPads. She said, "The majority of the kids could tell half the teachers how to use one (an iPad) because they have an iPhoneand there's so *few* differences between the two." Sandra also found that once she showed one student how to perform a specific function on the device, then the student would then help others. She went on to say, "When you help one, you can turn back around and one of the others is peer tutoring or showing their friend, 'Here, this is a faster way. This is an easier way.'"

Two participants, both mathematics teachers, did share experiences that reflected that they had to facilitate some kind of student training before implementing the devices. Although many participants mentioned that they set down rules for using the devices, Mary also spent some time researching and developing an iPad user contract that she required students to sign prior to using the devices. She spent some time reviewing the contract as part of the training. She said:

> I had to take several days to train them … I had all my kids sign it, and then just training them, you know, on what to touch, what not to touch … So, finally, we got everybody a Gmail account, which is what they use for logging onto their *Dropbox*, and correspondence with me …Then I guess afterseveral days of training, then you know, we would implement what I had trained them on, logging onto the *Dropbox*, taking notes, putting notes in the *Dropbox*."

Jennifer also mentioned setting rules as part of the training that took place, and said that it actually consisted of telling the students what they were and were not allowed to do on the iPads. She said that she also provided them with a basic overview of how to use the device, "You click on this or you double-click that. We've had to teach them how to double-click the home button to get the tray up at the bottom, to close off the apps that are not in use to save on the memory."

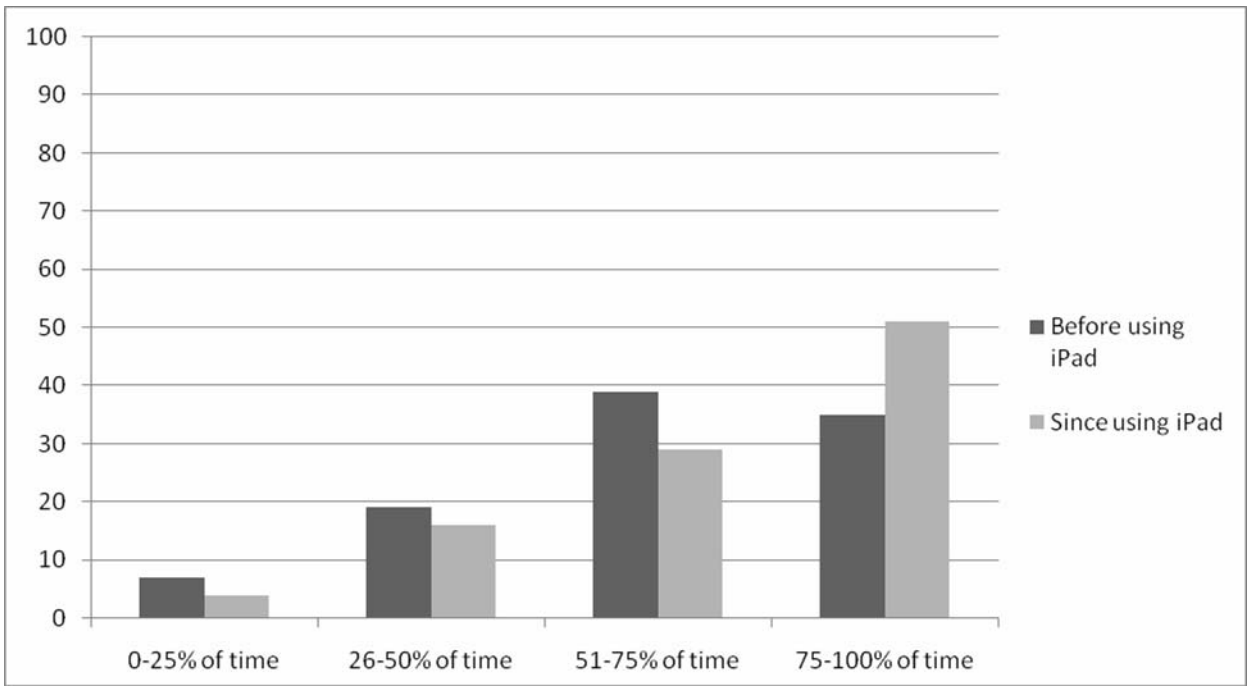
Finding 5: All eight of the participants (8 of 8 [100%]) expressed their beliefs that the device had a positive impact on student engagement. Most participants (6 of 8 [75%]) also believed the device had or would have a positive impact on student learning.

All of the participants (8 of 8 [100%]) indicated an increase in student engagement when iPads were in use. Sandra expressed her belief that the device had a very positive impact on student engagement with content in her classroom. She said, "I think they're engaged moreand I've seen personally, like I said before, the students that struggle or that didn't seem to put forth as much effort, are putting forth a lot more effort using the iPads." Jennifer articulated that she felt that her students were becoming more engaged when they were provided opportunities to use the devices as well. She said, "The kids love it. I mean, when the kids come in, they're like, 'Oh, iPads!' When they see the cart, they say, 'Can we use the iPads today?' They're excited.

They love it. I think it's going to help them become more engaged." Another participant described her students' level of engagement in the following way:

> They're more motivated to work using the technology …They're quiet (whispers). They're focused … That was a *major* observation that I made the first time I used them in my classroom. I could not believe it was *silent* in my classroom. (Michelle)

An additional caveat to this discuss involves one participant's desire to determine for herself how her students perceived the iPad implementation that took place in her classroom. The participant developed and administered a 40-item survey to her students, 97 of whom responded. The survey collected data on a broad range of issues related to the activities that took place in her classroom. A couple of questions and their responses are directly related to this finding (See Figure 2). When asked what percent of the time they were engaged in their classes *before* using the iPad, 7% of the students said they were engaged 0-25% of the time; 19% of students said they were engaged 26-50% of the time; 39% said they were engaged 51-75% of the time; and 35% said they were engaged 76-100% of the time. The survey followed with a question that asked students how engaged they were in their classes *since* using the iPad. The data indicated that 4% of students said they were engaged 0-25% of the time; 16% said they were engaged 26-50% of the time; 29% said they were engaged 51-75% of the time; and 51% said they were engaged 76-100% of the time. According to the participant's survey, most students experienced an overall increase in the amount of time they were engaged when they were provided opportunities to use the iPads.



[1]*Figure 2.Participant Survey Results: Student Engagement before and after using iPads in the classroom*

In the majority of classrooms (7 of 8 [88%]), students were actively engaged in content-specific learning activities. During one observation, Sandra asked her students to play the *Word Games* app and to write the first new words they encountered down on a piece of notebook paper. Once the students had played the game long enough to compile a list of ten words, they were to look up the words' definitions and put them aside for the next day's activity, for which the students would be engaged in a descriptive writing lesson. During the activity, all students were engaged and quiet. Every student could be seen writing down vocabulary words while the teacher monitored their progress.

During an observation in Mary's science class, students were working in groups to investigate alternative energy sources. As the researcher walked around the room, she noted that all students were working on their assigned tasks and discussing their topics of research.

[1] This chart displays the results of two survey questions that were administered by one of the study's participants.

Students could be heard assigning tasks, “Okay, I will write down the questions.” Students were overheard asking each other questions regarding the information they were discovering. One student read information from his iPad aloud to his group and then said, “Wow! But that is like small volumes and wouldn’t be much of an investment. It wouldn’t be good for our school.” The groups remained on task and engaged until the bell rang.

During an observation in Michelle’s classroom, students were playing an educational app intended to review grammar skills. The app was designed as a game and the students worked independently at their desks. The researcher made the following field notes:

> Some of the students laughed and smiled while they played the app. The teachers monitored and observed. The classroom was quiet. Most of the time, the only sounds to be heard in the classroom were sniffing, soft laughter, and the zipping and zinging of the game being played. Occasionally, a kid coughed or communicated quietly with a teacher nearby.

Although all teachers indicated that they believed student engagement increased and the researcher observed students being engaged with what they were doing, one observation did not reflect this. During an observation in one participant’s classroom, many students did not seem engaged. The participant was projecting a reading passage and was reading aloud to the class. The students were using their iPads to answer questions related to the passage as the teacher discussed what they had just read. During the observation, many students seemed bored. One male student closed his eyes during parts of the lesson and another yawned repeatedly. Some of the students propped their heads up with their hands. At one point, the participant said to the students, “You are looking at me as if you are made of stone.” One student replied, “But we don’t know what to write.” At another point in the lesson, one student asked how much more

they had to do today. Another stated, “This is horrible. Why do we have to do this?” The teacher ignored the students and returned to reading the passage aloud.

The majority of participants also expressed their beliefs that the iPad could positively impact student learning (7 of 8 [88%]). In a conversation about student engagement, Michelle communicated her thoughts about how engagement and learning were related when she said, “My students were more *willing* to complete their assignment and do their best when they’re using the iPads.” When the researcher followed with the question, “Do you think they’re learning more? Is there an increase?” She said, “Probably. It would have to be directly related if they’re more focused, and they’re striving to do their best. Then I would have to say there *would* be correlation.” Other participants connected the two areas of influence as well and expressed their thoughts in the following ways:

> It kind of disintegrates the barrier to learning. When a student sees a book and a piece of paper and a pencil, you can see the dread on their faces ‘cause they know it’s going to be bookwork. They know they’re going to have to write things down (uses mundane tone of voice). Whereas, with the iPad, it’s the *same* type of learning, but in a different format. So, it is more exciting. It is not a dread for them. They look forward to it and are *sad* to turn the iPads in at the end of class. They want to keep using them. So to keep learning, that is definitely a bonus there. (Mary)

> The kids that normally will not pick up a dictionary, they will. They love the thesaurus and the dictionary (apps). Being able to pick it up instantlyand being able to lookand find their answers instantly, and readand even find pictures on a particular word. (Karen)

Anotherparticipant, who had fewer opportunities to use the devices in her classroom as she shared a cart with other teachers, stated her opinion on the subject in following way: “Oh! I think there’s a *huge* potential that we have barely even begun to look at.” (Jennifer)

Although most participants believed that the devices could impact student learning, one participant did not articulate the same opinion. Karen said that she felt that the student learning was “probably about the same” but then followed with a statement about how the devices impacted student motivation to learn in her room. She said that the students who never did anything in her class before were, “constantly doing on those iPads.” She followed with:“Every person in here was very, very active. And I’m talking about *all* the time. It was *amazing*!”

It is interesting to also include in this discussion the student responses to the participant’s survey, mentioned earlier in this finding. She posed the question, “On a scale of 1 (not helpful) to 5 (very helpful), to what degree has the use of iPads helped your learning in class?” to which the students responded in the following way:

- 8 students (8%) indicated a ranking of 1 (not helpful) on the Likert scale.
- 15 students (15%) indicated a ranking of 2 on the Likert scale.
- 24 students (25%) indicated a ranking of 3 on the Likert scale.
- 28 students (29%) indicated a ranking of 4 on the Likert scale.
- 22 students (23%) indicated a ranking of 5 (very helpful) on the Likert scale.

Although descriptions were not provided for rankings 2 through 4, it can be assumed that more than half of the students ranked the helpfulness of the device to their learning with a score of 4 or 5, indicating that the majority of the students polled believed that the iPad had helped their learning in the class.

Chapter Summary

This chapter presented the five major findings discovered in this study. Findings were organized to reflect the study's research questions. Data from teacher interviews and classroom observations revealed participants' perceptions of their experiences implementing the iPad as an instructional tool in their classrooms. As is typical of qualitative research, direct participant quotations are embedded throughout the chapter in an effort by the researcher to accurately portray the reality of the phenomenon experienced by the teachers. Observational data were also included, where relevant, to further illuminate and support the findings.

The primary finding of this study is that the majority of participants indicated that they received limited professional development or training on implementing the devices in their subject areas during the pilot year. More than half cited that they relied on colleagues for support in integrating the iPads in their classrooms. This finding was derived from the expressed descriptions of 88% of the participants as they discussed the type and extent of professional development that the school district or individual school provided to them prior to implementing the devices in their respective classrooms. In discussing their professional development, several participants expressed that the training that the received was brief and focused primarily basic operation of the iPad. The majority of participants stated that, when trying to incorporate the devices into their curricula, they sought support from their colleagues, usually other teachers within their disciplines, or their school's media specialist. This type of support was usually limited to recommendations of particular devices that might be relevant to a particular subject-area. In discussing their experiences implementing the iPads as instructional tools during the pilot year, over half also admitted that they had struggled or felt frustrated because they did not always feel prepared to use the devices.

The second finding was that the overwhelming majority of participants did not demonstrate that implementation of the iPad as an instructional tool had influenced their pedagogy or teaching. Although half of the participants expressed that they believed that a pedagogical shift had occurred, when probed further all participants (100%) described or demonstrated iPad activities that were similar or consistent with those that they used prior to implementation. For example, some participants replaced paperback novels with digital versions of the same book, administered multiple choice tests using the devices instead of on paper, or required students to create Keynote presentations on the iPads instead of PowerPoint presentations using computers. Other teachers facilitated constructivist-style, collaborative activities both before and after implementation.

The third finding was that all eight participants facilitated curricular connections that reflected and addressed pre-established content or subject area goals. Many participants discussed how their planning for the use of the iPads reflected their curricular goals. Most participants also referenced at some point during their interviews how they had connected the iPad activities they were designing for their students to state frameworks, the Common Core Curriculum for their subject and grade level, or standardized, state-mandated tests. Half of the participants also discussed apps that they had used with their students that served to review previously learned skills or content. In all classrooms, activities were content-relevant and served to advance an established curriculum.

A fourth finding, and one that the researcher found quite interesting, was that 75% of participants indicatedthat they had relied on students, at some point during implementation, to assist or support the use of iPads in their classrooms. In one building, participants described how a student “geek squad” assisted with maintaining the carts of iPads, and on occasion, assisted in

their classrooms. The majority of participants also cited incidents when students assisted them with performing a task or helped other students. In seven of eight participants' classrooms, students were observed supporting each other in the use of the devices (Note: One participant was not observed as she discontinued use of the device prior to the beginning of the study). The majority of participants also said that they were not required to formally train the students in the use of the devices before they could be used as instructional tools in their classrooms. Some teachers cited that many of their students already had iPads, iPhones, or smart phones, which facilitated their understanding of how to use the devices. Instruction was mostly limited to rules and guidelines for appropriate use.

A fifth finding was that the overwhelming majority of participants expressed their beliefs that the device had a positive impact on student engagement. All participants articulated specific examples of student behaviors that demonstrated student engagement. These examples included reduced classroom management issues, quiet classrooms, and an increase in participation by students who were normally reluctant to participate in class activities. During all observations by the researcher but one, students were noted as actively engaged in using the iPads to learn academic content. Field notes revealed that student dialogue and actions represented on-task behaviors. Most participants also believed that the iPads had or would have a positive impact on student learning. Some participants expressed their beliefs that engagement and learning were closely connected, citing that engaged students were spending more time on task, and therefore, must be learning more.

This chapter presented the five findings uncovered by the study and were organized to reflect the four research questions revisited in the first section.

Chapter 5

Interpretations, Implications, and Recommendations

Introduction

The purpose of this study was to examine the implementation of the iPad as an instructional tool through the experiences of classroom teachers. It was hoped that the knowledge generated from this research would provide new insights into the impact of classroom iPad integration on teacher pedagogical behaviors and student learning experiences, as well as inform integration practices in educational practice in general.

Study Overview

This research followed an inquiry model that focused on collecting qualitative data in the participants' natural setting, their classrooms. The data were collected through in-depth interviews and classroom observations. Participants in the study included eight teachers who were in the process of integrating iPad technology in their respective disciplines during an implementation pilot year in their district. The data were coded, organized, and analyzed initially by research question. Subsequent reviews of the data resulted in the development of thematic categories and subcategories that reflected both the research questions and the study's conceptual framework, as discussed and illustrated in chapter 2. The study was based on the following four research questions:

1. How is the iPad being used as an instructional tool?
2. How are curricular and disciplinary connections made?
3. What pedagogical shifts, if any, are occurring?
4. What types of student interactions are taking place?

These four research questions were largely satisfied by the five findings presented in chapter 4. The overriding finding of this study revealed that participants received limited professional development or training on implementing the devices as instructional tools in their specific subject areas during the pilot year. As a result, teachers were left to rely on themselves, their colleagues, and their students for assistance in integrating iPads in their classrooms. An additional perceived consequence is that the limited professional development resulted in iPad integration practices that did not illustrate a pedagogical shift in teacher behaviors. Because the study sought to examine the implementation of the iPad through the experiences of teachers, it is possible that this finding reverberates through each of the other four findings in that the professional development received could have impacted pedagogy, curricular connections, reliance upon student support, and teacher perceptions regarding the value of the device.

The previous chapter presented the findings of this study by organizing the data from the interviews and classroom observations into related segments that were intended to facilitate a readable and understandable narrative that reflected the lived experiences of the participants. The purpose of this chapter is to provide interpretative insights into these findings. Whereas the findings chapter disassembled or divided the data into manageable chunks in an effort to expose the phenomenon as experienced by the participants, this chapter is intended to facilitate a holistic and integrated understanding of those experiences. In facilitating this process, the researcher sought to synthesize related themes or patterns that emerged among the findings. The overarching and interrelated ideas that were discovered are framed by the following three analytic categories:

1. The relationship between professional developmentand teacher preparedness to integrate technology in their respective disciplines.

2. The relationship between teacher pedagogical behaviors and iPad implementation.
3. Teacher perceptions about the value of iPad integration in classrooms.

The first two analytic categories holistically reflect the study's four research questions and conceptual framework. The third analytic category emerged as a major theme, despite the fact that the study did not set out to intentionally explore teacher perceptions related to the value of the device. However, the frequency of teacher references related to value in terms of student engagement and learning prohibited exclusion of the category. Beyond this stage, the researcher extended analysis to compare and contrast the issues reflected by each of the analytic categories to that found in the limited available literature.

This analysis-to-synthesis process assimilated the following structural components that served to frame the interpretations: (a) common threads within participants' experiences, (b) ways in which participants describe or explain these experiences, (c) unanticipated findings among experiences, (d) consistency or inconsistency to related literature, and (e) extensions of the data beyond existing research.

The discussion takes into account existing literature related to the impact that professional development has on preparing teachers to integrate new technologies in their classrooms, why teacher behaviors may or may not be influenced by the introduction of such technologies, and how teachers perceive the value of technology to student engagement and learning. The interpretations and conclusions discussed within each analytic category are intended to provide new insights into the impact of classroom iPad integration on teacher pedagogical behaviors and student learning experiences. Immediately following these sections are a brief summary and implications that the researcher has identified regarding the study's

findings. The chapter concludes with a brief reexamination of the researcher's assumptions noted in chapter 1 and a final reflection of the study.

Interpretation of Findings

Analytic Category 1: The Relationship between Professional Development and Teacher Preparedness to Integrate Technology in their Respective Disciplines

The first finding from this study established that the majority of participants received only limited professional development or training on implementing the iPad as an instructional tool in their respective disciplines. The finding is preeminent because it is feasible that the limited amount of training received by participants influenced their pedagogy or teaching behaviors, and subsequently their experiences. In most cases, professional development was focused on training the teachers to operate the device. As a result, the majority of teachers sought support for integrating the devices from colleagues. Surprisingly, most teachers also expressed that they relied on students in their classrooms for additional support with integrating the devices. Half of the participants also confided that they struggled to integrate the iPads into their curricula at some point during the pilot year. It is conceivable then, that the participants were not adequately prepared to implement iPads in their classrooms before they began the pilot. One of the participants, Beth, reflected this view when she said: "*One* workshop, you know, just is not sufficient for us. I mean, we're still overwhelmed."

There are two major underlying themes that serve as possible explanations for this interpretation: (a) the professional development or training provided to the participants was insufficient in readying them for implementing carts of iPads in their classrooms, or (b) the technology proficiency levels of teachers prior to beginning the implementation process

contributed to participant feelings of unpreparedness. Each theme will be discussed in the paragraphs that follow.

Professional development or training provided to the participants was insufficient. Research by Shapley, Sheehan, Maloney, & Caranikas-Walker (2010), revealed that teachers who received "school-level supports in combination with a wide array of curricular and assessment resources and logistically more convenient technology access, expressed increasingly stronger ideological affiliations across time with technology integration and learner-centered instruction" (p. 24). The majority of participants indicated that the professional development that they received did not reflect this perspective. Instead, many teachers said that the training that they received was basic, when they received any professional development at all. The training was not job-embedded or discipline specific, and support was limited to that the participants were able to receive from either colleagues or their students. Learning to operate a new technological tool for personal purposes constitutes one kind of training. However, it can be argued that applying the tool for instructional purposes within the content area is quite another. It is a possibility that some of the participants, who well understood how the device functioned, were unable to determine how to relevantly apply the iPad within their respective disciplines.

According to Darling-Hammond and McClaughlin (1995), the most effective models of professional development allow teachers opportunities to apply new concepts and strategies within their disciplines. Because every participant in this study, with the exception of one, expressed that the training received was generic in nature, it was difficult for many of the teachers to find an appropriate or effective way to integrate the devices into their curricula. As a result, some participants contended that the difficult part of the implementation process had been in planning activities that were relevant to their subject areas. Patricia best expressed the need

for professional development that assisted with integration in her content area when she said: "We need to go! And when somebody out there in math can tell me how to do this thing, I'm right there, trying to listen and you know, see what they're doing." Consequently, professional development that does not include components that focus on application within specific disciplines may leave some teachers feeling confused or frustrated as they try to figure out, on their own, how to best use a new piece of technology as an instructional tool in their classrooms.

Although inadequate training can certainly lead to frustration on the part of some teachers, it is also conceivable that the technology proficiency levels of some of the participants may have contributed to these emotions. Half of the participants described their technology experiences prior to implementation as limited, and more than half expressed that they felt anxious when they found out that they would be expected to use iPads with their students during the pilot year. While none of the participants were new to the teaching profession, it is plausible that the coursework that they completed while preparing for their careers did not provide a good foundation of technology proficiency or the knowledge and application needed for integrating technology in the classroom. Although research indicates that all teacher preparation programs in the United States do integrate technology somewhere within coursework and/or field experiences, the vast majority of technology training is delivered in the form of a stand-alone technology course designed to prepare all levels and disciplines of future educators (Gronsethet al., 2010). These courses, because they provide a generic, one-size-fits-all-disciplines and grade levels approach to technology training, seldom provide pre-service teachers with opportunities to practice integrating the technology in an actual classroom. As a result, new teachers may have limited experience in planning and delivering a lesson that integrates a technological tool, such as an iPad.

Technology proficiency levels of teachers. Closely related to this conversation about new teacher preparedness to integrate technology is a discussion regarding prior technology integration efforts on the part of the participants. Two participants, who could be considered veteran teachers based on the number of years of experience each has in the classroom, expressed that technology-enriched lessons were not something that they frequently provided to their students. When Karen was asked to describe her prior experiences integrating technology, she said that it was very limited and shared, "I'm not that much into it. I used the iPadfor a semester. Not for a semester, for nine weeks." Although the cart of iPads was purchased specifically for Karen's classroom, she expressed that she felt more comfortable using "other ways" to teach, and decided to discontinue using the devices after nine weeks. Similarly, Beth stated, "I am much more comfortable with pen and paper, you know, and the dry erase board." She described her prior attempts at integration as "pitiful" and also expressed that the training that she had received was just "too fast." Like many teachers, these two participants remained at the beginning or novice level of ISTE's NETS for Teachers continuum of technology proficiency, consistent with the literature examined in chapter 2. This may be attributed in part to the fact that technology, in its various forms, was not always available for use in their classrooms. Another consideration is that when teachers do not achieve a basic foundation of technology literacy, they struggle to transfer or apply what they do understand to new technologies, when they are introduced. The result is a reliance on methods that teachers have already established as effective with students.

In conclusion, it is feasible that professional development that does not address differences in technology proficiency among teachers, or that is not differentiated to support

content-specific integration may not adequately prepare teachers to integrate new technology, such as a cart of iPads, in their classrooms.

Analytic Category 2: The relationship between teacher pedagogical behaviors and iPad implementation

In continuing the synthesis of the five findings to broaden our understanding of the phenomenon, the second analytical category seeks to explore possible explanations of why teacher pedagogical behaviors remained uninfluenced by the implementation of the iPad during the course of the school year. It is important to note that none of the participants *exhibited* a pedagogical shift. However, half of the participants stated that they felt that their teaching behaviors, such as planning, designing student activities, and assessment were influenced. If taken at face value, then it might appear that the device could have impacted these areas. However, when probed to explain further, these four participants cited changes in the emotions they experienced when using the devices in their classrooms. Sandra described the change in the following way: "To be honest, I feel like I'm more excited about it (referring to her teaching), and I feel like the students have more positive energy. Does that make sense? Because, I *am* more excited about it."

The four participants, when asked to describe in more detail how their pedagogy had changed, gave examples that did not illustrate a change in their teaching behaviors. For example, Michelle stated that in the past, her lessons had focused on the use of "pen and paper," but now she felt the device could "be used in so many different areas." The researcher asked the participant to describe some of the iPad activities that she now used with the students. Michelle shared that her students had conducted research on the iPads and then used the research to handwrite papers. She said, "I asked them to make me a hard copy and that was turned in. They

just gathered their research on the iPad." Similarly, both Mary and Sandra described activities they designed for students prior to implementation of the carts of iPads, that were constructivist in nature, technology-rich, hands-on, and that provided for collaboration among students. The iPad activities that they implemented during the pilot year provided very similar experiences.

There are three major underlying explanations that could explain why a pedagogical shift did not occur in any of the participants: (a) the design of the pilot; (b) participant focus on meeting standards; (c) and personal factors. Each of these interpretations will be discussed in subsequent sections.

Design of the pilot. It is a possibility that the design of the pilot could have contributed to the lack of influence that the iPad had on teacher pedagogical behaviors. All study participants had access to carts of iPads. However, not all participants had a cart dedicated for use in their classrooms. As a result, some of the participants had to share the carts with other colleagues and check-out the devices through a system in place in their building. One participant stated that this posed an issue in her classroom because the carts of devices did not all feature the same apps. If there was an app that she wanted to use in her classroom, she had to reserve a particular cart, and that cart was not always available. She also said, "It's hard for me to plan exactly what I want to do on them. So whatever apps are on the cart, I want to make sure I have those same apps on my *own* iPad, so that I can test them out first." Limited access to the carts by some teachers did not allow them opportunities for trial and error or to monitor and adjust their lessons, as needed. Therefore, participants tended to continue with activities that they knew would work instead of experimenting with a new activity in their classrooms.

Another participant, who did receive a dedicated cart, expressed that the decision to implement iPads in her classroom was not one that she had a voice in making. Her department

decided to replace textbooks with the devices and each teacher within the department was issued a cart of iPads. She said that she just decided, "If I am going to have them, I will do the best that I can." Therefore, it is also possible that some of the participants did not want to use the devices in their classrooms, but were required to do so by administration.

Another perceived issue with the design of the pilot could relate back to the first analytic category, professional development. Because the professional development provided did not focus on content-specific implementation, it is possible that some participants did not know how to use the devices to teach differently. Although they now had access to more Web-based resources and apps that were applicable across disciplines, they were unaware of how to go about designing activities that could extend learning beyond what was traditionally taught in the classroom. Similarly, the technology support that was available to participants lacked an instructional component and one participant voiced a concern that the training that was provided was brief because, "Our tech guys are PC-oriented and obviously this is a Mac." It is a possibility that those who were responsible for supporting the participants may have not been provided the training they needed prior to the pilot year, as well.

Participant focus on meeting standards. A second interpretation made by the researcher regarding why a pedagogical shift among teachers did not occur is related to participant concerns with meeting state frameworks, Common Core Standards, or preparing for state-mandated standardized tests. According to Brooks and Brooks (2013), constructivist instructional practices are frequently "crowded out of the curriculum by practices designed to prepare students to score well on state assessments" (p. 223). The majority of iPad activities designed by the participants reflected content areas goals. This is, of course, one of the objectives of any effective lesson. However, many of the activities reflected drill and practice,

reviews of previously learned content, or basic worksheet-style lessons that were similar to those in place prior to implementing the devices. The majority of participants also required that students work as individuals to complete tasks. Few opportunities for collaborative work, creativity, or to extend thinking beyond rote memory, were provided. Based on the researcher's observations and teachers' descriptions of these activities, it appears that participants may have been concerned that a departure from the lessons they already perceived to be effective might result in a decrease in student learning and achievement on state exams. Patricia probably expressed this concern best when she said:

> Because of the End-of-Course test, I couldn't just throw away what I was doing. I had to kind of integrate it into what I was doing without getting a situation where I wasn't teaching as much material as I know I have to teach every day.

Personal factors. A third interpretation attributes the lack of pedagogical shift to personal factors among participants. As discussed in the first analytic category, differences in proficiency levels using technology could certainly be considered a factor. An additional consideration is that teachers may tend to rely on methods with which they are already familiar and may prefer to design instruction that falls within their comfort zone. A final personal factor could be related to classroom management. Several teachers indicated that classroom management issues actually decreased when students used the devices. However, in most cases, the activities that the teachers designed did not facilitate interaction among students. It could be assumed that participants did not design lessons that encouraged talking or group work because they feared that students would misbehave or become disruptive. In half of participants' classrooms, students were asked to refrain from talking during iPad activities.

Further, some participants articulated that they were concerned about the iPads getting broken or stolen while in their classrooms. As Karen stated, "There was a lot of stress involved in having that iPad, all those iPads in your room. I think *that*, probably, honestly is another reason why I haven't used them anymore than what I have." In light of these concerns, it is conceivable that participants may have wanted to maintain a semblance of order and therefore, continued to design instruction that served to maintain classroom management procedures that were already in place.

The potential of the iPad as an instrument for facilitation of constructivist models for learning exists, but research to date reflects that teachers may not be utilizing the device to its full potential and that implementation results remain mixed, at best (Kinash, 2011). This study concurs with Kinash's research.

Analytic Category 3: Teacher perceptions about the value of iPad integration in classrooms

Whereas the first two analytic categories offer holistic interpretations reflecting both the research questions and the data from findings one through four, the third analytic category emerged as a major theme outside the realm of the study's purpose. The study did not intentionally set out to explore teacher perceptions related to the value of the device. However, the frequency of teacher references related to value in terms of student engagement and learning prohibited exclusion of the category. In light of these references, it is obvious that participants' perceptions of how the device might influence these areas most certainly contributed to their experiences implementing iPads in their classrooms.

The overwhelming majority of participants expressed the perception that iPads have the potential to positively impact student engagement. Similarly, the majority also felt that the devices could also impact student learning. When Michelle considered the impact the devices

had on her students, she conveyed her perception that student engagement and learning were connected. She said, "It would have to be directly related if they're more focused and they're striving to do their best. Then, I would have to say there *would* be a correlation." The major interpretations of this finding indicate that there are at least three possible reasons why teachers perceived increases in student engagement and learning.

Student factors. The first reason considers student factors. Today's student has grown up in a technology-centric world and the majority of students in the United States have had some experience using technology for personal and academic tasks. Many students are comfortable using technology, even that that is unfamiliar, to complete school work when asked to do so. Similarly, most students are not afraid to transfer knowledge of one form of technology to another, or apply what they've learned for personal purposes to an academic task. During an interview with Sandra, she described the types of students that she had in class and their high technology proficiency levels. She said that most of the students could show the teachers how to use the iPads because half of them "have an iPhoneand there's so *few* differences between the two. They're very familiar with it. And if they don't have an iPhone, they have a smart phone of some kind." The observed comfort level and ease of training of the students may have contributed to the perception that the devices were positively impacting student engagement and learning. The students embraced the technology and were vocal in their excitement to use iPads to complete their coursework. This excitement and prolonged time-on-task indicated to participants that the students were more highly engaged, and as a result, were learning.

Classroom management. A second explanation for participant perceptions of the impact the device had on student engagement and learning was, again, related to classroom management and changes in student behaviors. Many participants expressed that the students

were well-behaved during sessions that provided them opportunities to use the devices. As mentioned earlier, the decrease in classroom management problems and extended time spent on task that occurred were attributed to high levels of student engagement. Three participants also expressed that some students in their classrooms who typically were not willing to participate in class activities began participating. Karen said, "The kids that would never do anything in classroom, they were constantly doing on those iPads. Every person was in here was very, very active. And I'm talking about ALL the time. It was *amazing*!" Similarly, Beth attributed student willingness to participate to classroom activities that involved the iPad in the following manner: "Most of them, you know, were good with that …It goes back to that different intelligence. Even though they may struggle with reading, or writing, or math skills, that technology is nearly natural to them."

It is, of course, arguable that student engagement was not related to learning at all but could have been attributed to student engagement with the device itself. Not all students have access to iPads in their homes, or even in all of their classes. The novelty of getting to use a new device, one that is quite trendy at the present time, could have contributed to the high levels of student engagement that the teachers perceived to have occurred.

Quality of student work. A final explanation was based on the experiences that two participants shared regarding the quality of their students' work. Linda said that she no longer had to struggle to read students' handwriting because everything was typed and a digital copy of the work submitted to her for grading. She also explained that the students were able to look up words in the iPad's dictionary and thesaurus apps, which improved their vocabulary. Likewise, Sandra shared that her students had stopped asking her how to spell unfamiliar words, that they had become reliant on the tools available on the iPad to self-solve those types of issues. Because

so many reference resources (i.e. calculators, encyclopedias, graphic organizers) are available to students on the device, it can be assumed that students began to rely more on other resources available to them, other than the teacher. This interpretation is consistent with Boran's (2011) research, which also noted improvements in tasks related to writing and editing documents. However, it remains unclear if more learning is actually occurring, or if students are simply taking more responsibility for their learning.

Summary of Interpretation of Findings

This chapter portrayed the experiences of classroom teachers charged with implementing the iPad as an instructional tool. In summary, the prior discussion illustrates the intricate nature of their unique experiences and reveals several reasons why the professional development that they received may have been inadequate, why none of the teachers experienced a shift in their pedagogical behaviors, and as an added caveat, why they perceived iPads to have the potential to positively impact student engagement and learning. The goal of the synthesis process was to produce a holistic and integrated interpretation of the five findings and the four research questions presented at the beginning of this chapter. The challenge throughout this process was to uncover the patterns and themes that emerged from the extensive amount of data, and then to develop a readable narrative that would facilitate an understanding of the phenomenon of interest. In addition, the researcher performed extensive cross-participant analyses and found only minimal demographic dynamics that could have influenced the study's findings (years of experience, age, subject area).

Presenting an interpretation of the findings warrants a discussion of the study's limitations. First, the research sample was small, comprising interview data from only eight participants and fourteen classroom observations. Second, the participants all volunteered to

participate in the study because they were interested in the topic and wanted to contribute their experiences to the discussion. It is important to note that other teachers were involved in the district's initiative who did not volunteer to participate and therefore, their experiences cannot be assumed or represented. Third, although the researcher would have preferred a sample that represented all curriculum areas, only mathematics, English/language arts, and science were represented. Because of this, assumptions cannot be made about the experiences of teachers implementing iPads in the social sciences, in electives, or other courses. For these reasons, the conclusions that can be drawn can only reflect the experiences of these participants.

Qualitative research, by definition, is subjective and therefore subject to bias on the part of the researcher at each stage throughout the process. The researcher acknowledged her potential for bias based on her prior experiences and knowledge on the topic of technology integration in the classroom. The researcher, however, was committed throughout the process to self-reflection, reflexivity, and peer and participant validation to ensure validity and reliability. In an attempt to constantly evaluate her own bias, the researcher engaged in ongoing discussions with colleagues knowledgeable of the research process, as well as those knowledgeable of the implementation pilot at the research site. Additionally, the research design called for triangulation of the data through the use of multiple data collection methods and by obtaining multiple perspectives. Nonetheless, this chapter is strictly the researcher's interpretation of the teachers' experiences and the phenomenon could certainly have been understood or interpreted differently by others.

Implications of Findings

In the following sections, the researcher offers implications based holistically on the five findings and their interpretations. The implications that follow are for: (a) practice; (b) further research; and (c) policy.

Implications for Practice

Considering that there are multiple factors that could potentially influence the experiences of teachers charged with implementing new technologies, such as carts of iPads, in their classrooms, it is crucial for different groups to examine their roles and consider carefully the decisions they make regarding technology integration in their respective areas.

Teachers. Educators who are considering iPad integration in their classrooms should:

1. Determine what type of implementation model is best suited and possible for their discipline and teaching style. Although optimal, a one-to-one model is not always financially feasible. Depending on the educator's discipline and instructional style, smaller sets of the devices may be implemented effectively in a classroom. For example, if a teacher already utilizes project-based learning and collaborative group work, then a set of ten devices might be sufficient for these tasks.
2. Conduct as much research as possible on using iPads in their respective discipline. Quality apps and textbooks have not been developed for all disciplines. The teacher may find it necessary to develop his or her own content, which will require an extensive amount of time.
3. Seek additional professional development. Teachers must be prepared to ask for training when it is needed. Rarely are school districts able to provide the job-

embedded, content-specific training needed. Therefore, teachers should be prepared to seek outside professional development and be willing to invest their own money in such training, if necessary.

4. Finally, teachers should seek to design iPad activities that facilitate higher-order thinking and that encourage students to collaboratively and creatively construct their own knowledge. Change is difficult, especially when much is at stake. However, when these types of activities replace more traditional lessons, then the learning is deeper and is retained longer.

Administrators. School administration charged with making decisions regarding technology purchases (specifically iPads for classroom use) should consider:

1. That adequate funds are available for large-scale technology implementation projects. There is more to consider than just the original outlay or upfront expense of purchasing the devices. Not only does a robust networking infrastructure have to budgeted, but adequate training and ongoing support for technicians, media specialists, and teachers has to be built in to the financial plan. Equipment purchases and professional development should be viewed as complimentary to one another and necessary for functionality. If all components are not in place, then a district cannot expect an unproblematic pilot and subsequent years of integration.
2. Asking teachers if they want technology in their classrooms or requiring them to develop a plan for implementing the devices. Some teachers may not feel comfortable integrating carts of iPads in their classrooms and this could lead to a less than successful initiative. Additionally, some teachers may request the

devices, but may not be prepared to implement them. For that reason, a plan for implementation must already be in place.

3. Holding teachers accountable. If the district has made the decision to move forward with a large-scale implementation project that impacts teachers across departments, disciplines, or schools, then they must be prepared to hold teachers accountable and monitor to ensure that the devices are being used. When teachers appear to be struggling, then additional training and support may be needed.

Teacher Preparation Programs. Teacher preparation programs that want to better prepare their candidates for integrating technology in their future classrooms should:

1. Stay abreast of the technologies being used in local school districts and then make those same technologies available to their students. Although a university cannot make available *every* technological tool available in the various schools, they can ensure that the basic tools are available so that their students are at least familiar with them. Another solution is to provide field experience opportunities to students at various school sites and require them to experiment with using the technology in an actual school setting.
2. Train all education faculty to integrate technology in their courses and to design activities that facilitate opportunities for pre-service teachers to apply technology integration in their own lessons. When technology training is limited to what is learned in a single educational technology course, candidates cannot apply what they have learned across coursework and may not see the value in learning to use the technology. Faculty should model the skills that they advocate.

3. Liaison with local school districts to determine new teacher technology training needs. The schools are the best resources for assisting schools of higher education in determining what should be taught to best prepare new teachers for the classroom.

Recommendations for Future Research

The researcher recommends further studies be conducted in an effort to expand our understanding of how teachers might better approach implementing iPads in their classrooms. Taking this into consideration, the following should be considered for future research:

1. Based on the limitations of the study, a larger sample of teachers (across grades and disciplines) who have recently or are currently implementing individual, sets, or carts of iPads should be conducted to determine if the same or similar findings would be discovered.
2. A similar study that examines the experiences of students involved in an iPad initiative. The study should focus on the impact the device has on student engagement and learning.
3. A study that compares the experiences of teachers who receive ongoing, job-embedded, content-specific professional development and teachers who receive only basic, content-generic training on iPad integration. This research should seek to examine whether teacher perspectives among the two groups are similar or different, as well as implications for shifts in pedagogical behaviors.

Recommendations for Policy

When districts undertake a large-scale technology implementation project, such as purchasing iPads for classrooms, it is important to consider, in advance, any policy revisions or

additions that might be necessary to ensure that the technology is used appropriately. Districts should consider:

1. Developing an appropriate use policy for teachers. Policies should be in place that require teachers to limit their use of school technology to those activities which serve an educational purpose. The district should determine if teachers will be allowed to take the technology at home with them in an effort to prepare lessons. If permitted, then an appropriate check-out system should be developed. Additionally, the policy must require teachers to monitor student use of technology to ensure that online behaviors are appropriate and conducive to learning.
2. Developing an appropriate use policy for students. Within the policy, it should be clarified that students are responsible for the devices care when in their possession. This is especially important if the district has adopted a one-to-one initiative that allows students access to technology around the clock. The policy should also require that technology be used for academic purposes and develop a system for monitoring technology usage off-site. The policy should enumerate activities deemed unacceptable or inappropriate. The policy should also communicate student liabilities related to loss, damage, and theft. Parents should be informed of the policy before technology is issued to students.

Conclusion

In conclusion, the researcher would like to briefly revisit the assumptions posited in chapter 1 and then close with a few remarks regarding the researcher's perceived significance of the study. The assumptions were based on the researcher's background knowledge and

professional experiences. The assumptions will be discussed with regards to the analysis of the study's findings.

The first assumption posited by the researcher was that undergraduate coursework does not adequately prepare classroom teachers to integrate new technologies into their curricula or disciplines. This assumption was difficult to evaluate as the majority of participants completed their coursework some years ago and had several years of teaching experience at the time of the study. It is evident, however, that teachers must be willing to stay abreast of changing technologies and seek opportunities to further their experiences with implementing new technical tools in their classrooms. The majority of participants indicated that they received limited professional development that prepared them to integrate iPads in their content areas. Therefore, it is also imperative that teachers be willing to seek guidance and support outside of that provided by their school districts.

The second assumption asserted that practicing teachers may be required to implement new technology initiatives unwillingly and without adequate support for effective integration. This assumption turned out to be partially true. Although the participants did not articulate that they participated in the pilot initiative unwillingly, many participants did express that they were not provided adequate support for integration of the devices.

The researcher believes that this study is significant for the following reasons. The study serves to increase educator understanding of how teachers approach technology integration, and specifically iPad integration. It is assumed that a better understanding of teacher perceptions regarding the processes and outcomes related to such initiatives and their own pedagogical behaviors was achieved. In effect, the study has the potential to inform instructional practice

related to technology integration in the academic curricula, which could benefit educators in general.

Researcher's Reflection

The researcher of this study embarked on a fascinating journey during this project. It was essential for the researcher to bracket personal feelings regarding her beliefs regarding the approaches to iPad integration and professional development for technology integration throughout the process. This was necessary to remain open to new ideas, attempts, and experiences. The researcher works at a university and is charged with teaching educational technology courses to pre-service teachers in an effort to prepare them for the classroom. In addition, she conducts professional development to in-service teachers on integrating a variety of technological tools in the classroom, including iPads. This study served to better inform the researcher regarding best practices for professional development and training and will serve to influence her own approaches to both endeavors.

The researcher hopes this study will increase our understanding of how teachers approach technology integration, and specifically iPad integration, in their respective disciplines and that it may serve to guide other teachers or school districts in implementing the devices in their own classrooms.

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Appendix A

IRB Approval

Office of Research Compliance
Institutional Review Board

November 29, 2011

MEMORANDUM

TO:	Brandie Benton Tom E.C. Smith
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	11-11-227
Protocol Title:	*Exploring the iPad as an Instructional Tool*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 11/29/2011 Expiration Date: 11/28/2012

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 20 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

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Appendix B

Exploring the iPad as an Instructional Tool
Consent to Participate in a Research Study
Principal Researcher: Brandie K. Benton
Faculty Advisor: Dr. Tom Smith

INVITATION TO PARTICIPATE
You are invited to participate in a research study about the experiences being provided to students involved in an iPad initiative at Lake Hamilton School District, Hot Springs, AR. You are being asked to participate in this study because you are a teacher who is implementing this initiative in your classroom.

WHAT YOU SHOULD KNOW ABOUT THE RESEARCH STUDY

Who is the Principal Researcher?
The principal researcher for this project is Brandie K. Benton, a Ph.D. student in the department of Curriculum and Instruction at the University of Arkansas.

Who is the Faculty Advisor?
The faculty advisor for this project is Dr. Tom Smith, Dean of Education and Health Professors.

What is the purpose of this research study?
The purpose of this study is to examine the experiences being provided to students involved in an iPad initiative at Lake Hamilton School District, Hot Springs, AR.

Who will participate in this study?
Approximately 9 - 20 classroom teachers will be asked to participate in this study. They have been identified as potential participants because they each received or have been provided access to a set of thirty iPads to be integrated/used in their classrooms beginning in the fall of 2011. These teachers range in age and are at different points in their professional careers. The participants teach the subjects of literacy or geometry at the high school, junior high school, or middle school in Lake Hamilton School District.

What am I being asked to do?
Your participation will require the following:

Participants in the research will participate in individual interviews and classroom observations. Teachers will also be asked to share lesson plans and activities that they have designed that integrate the use of the iPads in their classrooms. Sharing may take the form of participation in an online closed-access forum or through focus group participation. Each activity will explore the influence of the iPad on the pedagogical behaviors of the classroom teachers charged with designing student experiences associated with iPad implementation. The interview and observation processes will last approximately five months, beginning immediately and concluding at the end of the spring semester of 2012.

What are the possible risks or discomforts?
There are no anticipated discomforts associated with this study. There are two potential minimal risks to the participants that have been identified. The first risk could be teacher coercion to participate in the research by administrators or colleagues. There is a possibility that a teacher might not wish to participate but might be expected to do so because he/she has been issued a classroom set by the school district. The second risk might be reluctance on the part of a participant to divulge his/her true thoughts, perceptions, and pedagogical behaviors because of concerns regarding confidentiality. All data collected that can be associated with a participant or specific classroom will remain confidential.

What are the possible benefits of this study?
The benefits to participants are that the literature on the topics of implementation models, teacher pedagogical models, and student experiences related to the iPad will be increased. The research will be accessible to educators interested in iPad initiatives and to teachers seeking methods of implementation using various models. Participants will benefit as a result of the personal reflection that takes place through their participation in individual interviews.

How long will the study last?
The interview and observation processes will last approximately five months, spanning the spring semester of the academic year, 2012. Individual interviews will last for one hour. One or two observations per teacher are anticipated as necessary for adequate data collection. However, gaps in the data may require additional interviews and/or observations.

Will I receive compensation for my time and inconvenience if I choose to participate in this study?
No compensation is available to participants.

Will I have to pay for anything?
No, there will be no cost associated with your participation.

What are the options if I do not want to be in the study?
If you do not want to be in this study, you may refuse to participate. Also, you may decline to participate at any time during the study. Your job will not be affected in any way if you refuse to participate.

How will my confidentiality be protected?
All information will be kept confidential to the extent allowed by law and University policy. Participants will be assigned a pseudonym upon return of the consent form and all references will be made using the assigned pseudonym. All data will be stored on the researchers personal hard drive, which is password protected. Any identifying data will be subsequently destroyed upon the completion of the research project. If the results of this study were to be written for publication, no identifying information will be used.

Will I know the results of the study?

At the conclusion of the study you will have the right to request feedback about the results. You may contact the faculty advisor, Dr. Tom Smith by phone at 479-575-3208 or Principal Researcher, Brandie Benton at 501-815-3958. You will receive a copy of this form for your files.

What do I do if I have questions about the research study?
You have the right to contact the Principal Researcher or Faculty Advisor as listed below for any concerns that you may have.

Brandie Benton, Principal Researcher
Department of Curriculum and Instruction
University of Arkansas

Dr. Tom Smith, Faculty Advisor
Dean of Education and Health Professors
University of Arkansas

You may also contact the University of Arkansas Research Compliance office listed below if you have questions about your rights as a participant, or to discuss any concerns about, or problems with the research.

Ro Windwalker, CIP
Institutional Review Board Coordinator
Research Compliance
University of Arkansas

I have read the above statement and have been able to ask questions and express concerns, which have been satisfactorily responded to by the investigator. I understand the purpose of the study as well as the potential benefits and risks that are involved. I understand that participation is voluntary. I understand that significant new findings developed during this research will be shared with the participant. I understand that no rights have been waived by signing the consent form. I have been given a copy of the consent form.

_____

Appendix C

General Interview Guide

How is the iPad Used as an Instructional Tool?

Time of Interview: _____

Date: _____

Place: _____

Interviewee: _____

Introductory Questions

1. Please describe your current teaching/classroom situation.
2. Please describe your previous classroom experiences (i.e. number of years teaching; number of years at Lake Hamilton; number of years teaching assignment subject/grade).
3. How would you describe your prior experiences using technology in the classroom?
4. How did you feel when you heard that you would be receiving a set of iPads for your classroom?
5. How much preparation or training would you say you had before you implemented the device in your classroom? (FU: Please describe the kinds of training you received.)
6. Describe your experiences with implementing the iPad as an instructional tool.

Central Research Questions

1. Please describe the planning process required for developing a lesson that integrates the use of an iPad. (FU: What, if any, student training was required of you?)
2. Please share some specific iPad activities/lessons in which your students have engaged this year.
3. In your opinion, how well suited is the iPad for integration in _____ (discipline/subject/content area)?
4. What are some examples of curriculum or disciplinary connections that you've been able to make?
5. How has your pedagogy been influenced or not influenced since you began integrating the iPad?

6. Describe the types of student interactions that you've seen take place when they are provided opportunities to use the iPad.
7. What was the outcome? (asked repeatedly)

Follow-up Questions

1. Describe your beliefs about the impact or lack of impact the device will have on student learning and engagement.
2. What, if any, modifications do you plan to make to the device's implementation in the future?
3. Is there anything else that you would like to share about your experiences using the iPad as an instructional tool that we have not discussed?

Appendix D

Final Coding Legend/Schema

1. Implementation Approaches

CC	Classroom Cart
SC	Shared Cart
GA	Group Activities
IA	Individual Activities
CA	Constructivist Activities
TA	Traditional Activities

2. Curricular or Disciplinary Connections

M	Math
S	Science
ELA	English/Language Arts
SE	Special Education
Su	Suitable
NS	Not Suitable

3. Pedagogical Shifts

E	Experienced
DNE	Did Not Experienced
U	Unsure
TPH	Technology Proficiency High
TPM	Technology Proficiency Mid-level
TPL	Technology Proficiency Low

4. Learner Interactions

S2S	Student to Student
S2T	Student to Teacher
T2T	Teacher to Student

5. Teacher Perceptions

PIE-E	Pre-Implementation Emotion-Excited
PIE-A	Pre-Implementation Emotion-Anxious
PIE-N	Pre-Implementation Emotion-Neutral

LOP-P	Level of Preparedness-Prepared
LOP-S	Level of Preparedness-Somewhat Prepared
LOP-N	Level of Preparedness-Not Prepared
ILP	Learning Positive
ILN	Learning Negative
ILNe	Learning Neutral
IEP	Engagement Positive
IEN	Engagement Negative
IENe	Engagement Neutral

Appendix E

Data Summary Database

Database 1: Pedagogical Shifts

		Pedagogical Shifts			Teaching Approach			
Participant ID	**Name**	Experienced	Did Not Experience	Unsure	Group Activities	Individual Activities	Constructivist Activities	Traditional Activities
P1	Mary	**X**			**X**	**X**	**X**	**X**
P2	Patricia		**X**			**X**	**X**	**X**
P3	Linda			**X**	**X**	**X**		**X**
P4	Sandra	**X**			**X**	**X**	**X**	**X**
P5	Beth	**X**				**X**		**X**
P6	Jennifer		**X**		**X**	**X**		**X**
P7	Michelle	**X**				**X**		**X**
P8	Karen		**X**			**X**		**X**

Database 2: Professional Development

		Professional Development			Colleague Support		Struggled to Integrate		Mentioned Curriculum Goals	
Participant ID	**Name**	Received Adequate	Did Not Receive	Received Some	Yes	No	Yes	No	Yes	No
P1	Mary			**X**		**X**		**X**		**X**
P2	Patricia			**X**	**X**		**X**		**X**	
P3	Linda		**X**		**X**		**X**		**X**	
P4	Sandra	**X**			**X**			**X**	**X**	
P5	Beth			**X**	**X**		**X**			**X**
P6	Jennifer		**X**			**X**	**X**		**X**	
P7	Michelle			**X**	**X**			**X**		**X**
P8	Karen		**X**		**X**			**X**	**X**	

Database 3: Curricular Connections

		Curricular or Disciplinary Connections					
Participant ID	**Name**	Math	Science	Language Arts	Special Education (integrated)	Suitable	Not Suitable
P1	Mary		**X**			**X**	
P2	Patricia	**X**					**X**
P3	Linda			**X**		**X**	
P4	Sandra			**X**		**X**	
P5	Beth	**X**		**X**	**X**	**X**	
P6	Jennifer	**X**			**X**		**X**
P7	Michelle			**X**	**X**	**X**	
P8	Karen			**X**			**X**

Database 4: Reliance on Students

		Learner Interactions			Facilitated Student Training		They showed me!	
Participant ID	**Name**	Student to Student	Student to Teacher	Teacher to Student	Yes	No	Yes	No
P1	Mary	**X**	**X**	**X**		**X**	**X**	
P2	Patricia	**X**	**X**	**X**	**X**			**X**
P3	Linda	**X**	**X**	**X**		**X**	**X**	
P4	Sandra	**X**	**X**	**X**		**X**	**X**	
P5	Beth	**X**	**X**	**X**		**X**	**X**	
P6	Jennifer	**X**	**X**	**X**	**X**			**X**
P7	Michelle	**X**	**X**	**X**		**X**	**X**	
P8	Karen	**X**	**X**	**X**		**X**	**X**	

Database 5: Device Impact

		Beliefs about Impact					
Participant ID	**Name**	Learning Positive	Learning Negative	Learning Neutral	Engagement Positive	Engagement Negative	Engagement Neutral
P1	Mary	**X**			**X**		
P2	Patricia	**X**			**X**		
P3	Linda	**X**			**X**		
P4	Sandra	**X**			**X**		
P5	Beth	**X**			**X**		
P6	Jennifer	**X**			**X**		
P7	Michelle	**X**			**X**		
P8	Karen			**X**	**X**		

Database 5: Other Data

		Technology Proficiency Levels			Implementation Approach		Pre-Implementation Emotion		
Participant ID	**Name**	Tech Prof: High	Tech Prof: Mid-Level	Tech Prof: Low	Classroom Cart	Shared Cart	Excited	Anxious	Neutral
P1	Mary	**X**				**X**	**X**		
P2	Patricia	**X**			**X**		**X**		
P3	Linda		**X**		**X**			**X**	
P4	Sandra	**X**			**X**		**X**		
P5	Beth			**X**		**X**		**X**	
P6	Jennifer	**X**				**X**	**X**	**X**	
P7	Michelle		**X**			**X**	**X**	**X**	
P8	Karen			**X**	**X**		**X**	**X**	